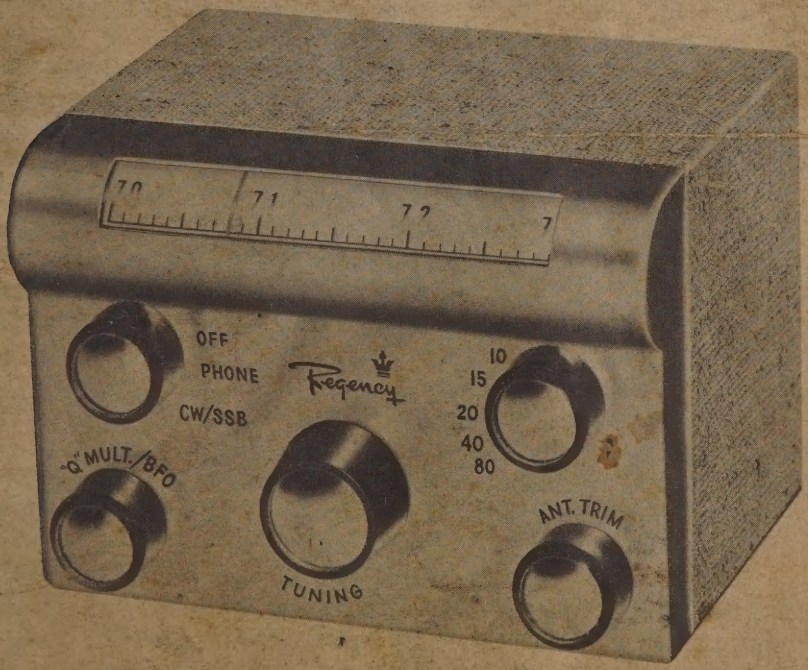
MR STRICKLAN
AA4WCW

Regency

ATC-1

TRANSISTORIZED AMATEUR BAND CONVERTER



OPERATING AND INSTRUCTION MANUAL

IMPORTANT: Shorted phono plug must be in "J 3" See page 6

DESCRIPTION

The Regency Model ATC-1 is an extremely compact, light weight, amateur band converter which can be used with any broadcast receiver (motor car, portable or home type) for the reception of amateur signals on the 80, 40, 20, 15 and 10 meter bands. The unit is completely self-powered by three 1-1/2 volt "Penlight" flashlight cells and therefore does not require "revamping" the receiver; with which it is used, for power take-off.

The ATC-1 features a superheterodyne circuit in which a surface barrier, p-n-p type, transistor (SB-100) functions as the converter (oscillator-modulator) and a rate grown junction, n-p-n type, transistor (2N169A) is employed as a "Q" multiplier for phone reception or as a beat oscillator for CW.

The oscillator circuit of the ATC-1 operates on the fundamental for reception of the 80, 40 and 20 meter bands and on the second harmonic for the 15 and 10 meter bands. Harmonic operation on these bands greatly reduces oscillator pulling when the antenna circuit is tuned.

Unlike most converter installations, it is not necessary to remove the automobile receiver to add sockets, switches or gain controls. The I.F. signals (1230 kilocycles) which are supplied to the car, portable or home radio are of the same general magnitude as the broadcast signals for which the set was designed; hence, an R.F. gain control is not necessary to prevent overload.

The use of the "Penlight" battery power supply in the ATC-1 provides constant power, isolation and stability regardless of the fluctuating generator voltage of the automobile. These features will be readily evident in the "drift free" reception of CW and SSB signals.

A clamp diode (D1) is connected across the input circuit of the mixer transistor. This prevents overload or possible damage to the transistor due to extremely high level, nearby transmitters when the converter is used in mobile installations.

Other novel features of the ATC-1 design are covered in the section detailing OPERATING INSTRUCTIONS.

INSTALLATION INSTRUCTIONS

Since the most popular application for an amateur band converter is in conjunction with an automobile receiver for mobile use, the installation and adjustment of the ATC-1 for this type of operation will be discussed first, with additional notes on other applications.

The light weight and small size of the converter permit mounting in any convenient location. These include under dash, glove compartment or steering post positions. Due to the possible variations of mounting, it has not been found practicable to design a universally acceptable bracket. A suitable bracket for the particular mounting position chosen can readily be fashioned from sheet or scrap metal stock.

Each of the mounting rails on the bottom of the converter have three holes tapped for 6-32 screws. Four felt feet are furnished to act as cushions when the converter is used with a portable or home set. These may be removed when mounting the converter to the bracket, thus providing a choice of six mounting holes.

It should be noted that the tapped holes are "blind" and in mounting the converter, proper length screws should be used which do not bottom and distort the case.

Before installing the ATC-1, three type AA "Penlight" cells should be inserted in the clips at the back of the unit. It is important that proper polarity be observed as shown in Figure 1.

ANTENNA

The antenna input circuit of the ATC-1 is matched to 50 ohms and optimum results are obtained on any band by the use of an antenna resonant to the band or properly loaded to obtain resonance. The use of such an antenna, however, will require changing or shorting out of the loading coil as bands are changed to obtain best results.

The use of the broadcast receiver antenna or a plain 10 meter whip offers an acceptable compromise and allows reception on all bands without additional switching complication.

SET UP ADJUSTMENTS

With the ATC-1 positioned so that the back panel alignment openings are accessible, the following operations should be performed:

1. Extend the auto radio antenna to its maximum height if a resonant antenna is not to be used.
2. Disconnect the antenna lead from the automobile radio receiver and plug it into the jack marked "ANT" at the back of the converter.
3. A length of low capacitance cable fitted with connector plugs at each end is furnished with the ATC-1. This should be plugged into the jack marked "REC" of the converter and into the antenna jack of the automobile receiver.
4. Set the function switch of the ATC-1 to the "OFF" position and turn the automobile receiver "ON". Tune the receiver to approximately 1400 kc and "peak" the antenna trimmer of the automobile set for maximum sensitivity.
5. Turn the function switch to the "CW/SSB" position and the "Q MULT/BFO" control to its maximum clockwise end of rotation.
6. Tune the automobile radio in the region of 1230 kc until the BFO carrier is heard. Rotate the "Q MULT/BFO" control in a counterclockwise direction until the carrier ceases. Advance the control slowly in the clockwise direction until the carrier just reappears. The receiver can now be set accurately to the carrier.
7. Turn the function switch to the "PHONE" position and the band switch to the 40 meter band.
8. Insert a fibre or plastic alignment tool into the slot in the tuning core of the I.F. coil (A2-Fig. 1) and adjust for maximum noise. Slowly advance the "Q MULT/BFO" control in a clockwise direction, repeaking the I.F. coil (A2) as the control is advanced. Continue this adjustment until the "Q" Multiplier breaks into oscillation. Normally the oscillation point is reached at about the maximum end of rotation. If a condition of oscillation cannot be reached, it will be necessary to adjust the trimmer marked

IMPORTANT: Shorted phono plug must be in "J 3" See page 6

"CA" (A3-Fig. 1) at the back of the ATC-1. Turn this adjustment in the counterclockwise direction, repeaking (A2) as the adjustment of (A3) is changed until the "Q" Multiplier breaks into oscillation at about 90% of the rotation of the "Q MULT/BFO" control.

After the above adjustments have been completed, the ATC-1 may be securely fastened in place.

USE WITH PORTABLE OR HOME RECEIVERS

In addition to its use for mobile operations, the ATC-1 is an ideal converter for fixed installation in the home or such transportable operations as amateur field day or camp uses.

In these instances, a suitable antenna, preferably of the resonant type, should be connected to the "ANT" input jack and a connection made from the "REC" jack to the antenna input of the receiver by means of the cable supplied with the ATC-1.

If the receiver has an external antenna post or clip, the center pin of the cable plug should be connected to this point and the sleeve or shield of the cable connected to the ground post or chassis frame of the receiver.

In the event that the receiver is provided with a loop antenna only, and has no provision for external antenna connection, coupling to the loop can be obtained by means of a few turns of wire around the low (chassis ground) end of the loop, if of the ferrite rod type, or taped near the loop if of the flat type.

The normal high impedance output connection of the ATC-1 will give satisfactory performance in most instances, but,. in the event a more ideal impedance match is required, a 300 ohm link winding has been provided on the I.F. output coil.

To use this link, it will be necessary to unsolder the connection at the bottom side of capacitor C7 (A3) and to connect this wire to the normally unused lug on the I.F. output coil L12 (A2). Extreme care should be exercised in making this connection to avoid damaging nearby components.

Set up adjustments 4 through 8 should be followed in making the installation.

BREAK-IN OPERATION

A phono pin jack, marked "J3" is provided at the rear of the ATC-1 to accommodate break-in operation when used with a transmitter. This jack permits the collector circuit of the SB-100 mixer to be opened by a set of contacts on the transmitter relay, thus disabling the converter during transmission. A shielded, single conductor cable should be used for wiring to the relay. It is important that no voltage be applied to this circuit. A shorting phono pin plug is provided with the ATC-1 and should be inserted in jack "J3" when break-in operation is not used.

OPERATING INSTRUCTIONS

All of the controls of the ATC-1 are clearly identified by marking on the front panel.

The "OFF" position of the function switch serves the dual purpose of turning the converter power off and connecting the antenna directly to the automobile receiver for the reception of standard broadcast programs.

IMPORTANT

Whenever the automobile receiver has been used for the reception of broadcast programs and it is desired to return to converter operation, it is important that the receiver be accurately tuned to the ATC-1 output frequency. This is of special importance when receiving CW or SSB signals (An exclusive feature of the ATC-1). The procedure of item 6 of the set up adjustments (page 4) should be followed to assure proper tuning. If the automobile receiver is equipped with push button tuning, one of the push button positions can be set up in this fashion for converter use.

BAND CHANGE

The band change knob simultaneously selects the proper tuning coils and rotates the dial drum to bring the calibrated scale for the desired band into view in the escutcheon window. When changing bands, it is desirable to repeak the "ANT TRIM" control for maximum signal or background noise. Normally, the control need not be readjusted, once

it is set on any one band. When using a resonant type antenna, however, some readjustment may be found advantageous in tuning across the band due to the impedance change of the antenna around resonance.

DIAL LIGHT

Since the current drain of the dial light is many times that of the converter circuit, a novel switching device has been incorporated in the ATC-1 design to conserve battery life. When it is desired to illuminate the dial, this is accomplished by pushing "IN" on the tuning knob. Upon releasing the knob the dial light is extinguished.

PHONE RECEPTION

For the reception of phone stations the function switch is set to "PHONE" and the "Q MULT/BFO" control is set at about the middle of its range. The "TUNING" knob is slowly rotated to locate the desired station or frequency. After tuning to the signal, the "Q MULT/BFO" control may be advanced slowly in a clockwise direction to increase the selectivity and augment the signal level. This will cause improvement up to the point at which the "Q" Multiplier breaks into oscillation.

CW RECEPTION

To receive CW signals, the function switch is turned to the "CW/SSB" position. The "Q MULT/BFO" control is advanced in the clockwise direction until a beat note or carrier hiss is just heard. It will usually be found that best results on CW reception will occur with the volume control of the automobile radio set near maximum volume position. This is due to the fact that the BFO carrier is causing the A. V. C. system of the automobile receiver to function and reduce the gain of the receiver. The "Q MULT/BFO" control thus acts as a supplementary I. F. gain control and its careful adjustment will produce optimum results. In practice, it has not been found necessary to incorporate an A. V. C. disabling switch in the automobile receiver.

SINGLE SIDE BAND RECEPTION

Single side band signals can be received using the same technique as just described for CW reception, however, the tuning of this type of signal requires considerable care in adjustment to obtain naturalness of voice. After tuning to the point where voice is intelligible, a slight adjustment of the "Q MULT/BFO" knob will assist in clearing up the signal.

NOISE REDUCTION

For satisfactory reception on high frequencies, it is necessary that the automobile electrical system be thoroughly filtered. The filtering for the standard automobile set, which tunes the broadcast band only, is usually not adequate for high frequency reception. Normally, the use of coaxial type bypass capacitors (Sprague #48P10 or equivalent) in lieu of the conventional capacitors will greatly aid in noise reduction.

While the procedure outlined above will eliminate noise from the automobile in which the ATC-1 is installed, ignition interference from passing vehicles may be troublesome. To reduce this type of interference any good noise limiter, of the user's choice, such as described in the Radio Amateur's Handbook, CQ, QST or the Radio Handbook, may be installed in the automobile receiver.

LOCAL BROADCAST INTERFERENCE

The choice of 1230 kilocycles for the output I. F. of the converter was made to avoid harmonics of the auto receiver osciliator falling in any of the amateur bands when used with either a 262 or 455 kc I. F. receiver.

If a local broadcasting station operating on or near 1230 kc should cause excessive interference when the ATC-1 is in operation, the output frequency may be changed to avoid such interference. Such a change and necessary recalibration are covered in the alignment instructions.

ALIGNMENT INSTRUCTIONS

The ATC-1 has been carefully aligned and calibrated at the factory and no adjustments should be necessary other

(Continued on page 16)

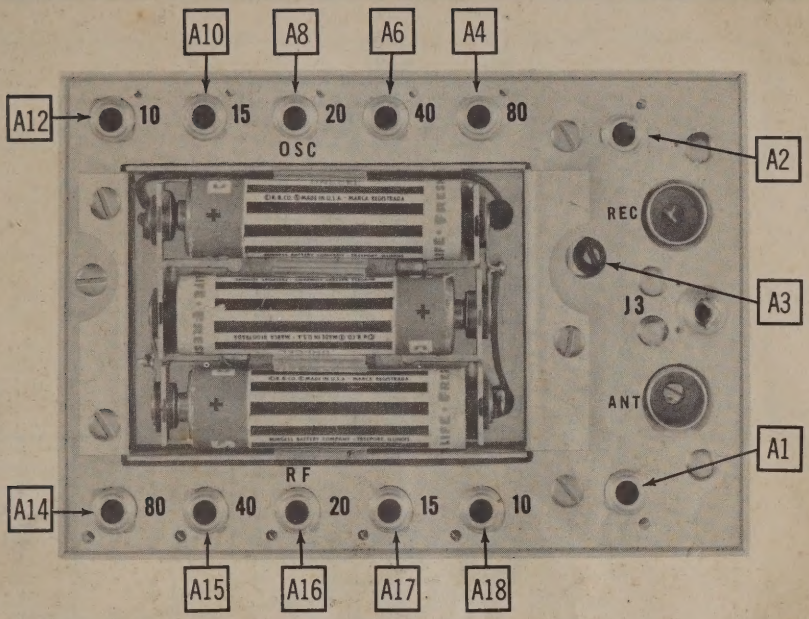


Figure 1. Rear View (Battery Placement and Alignment Points)

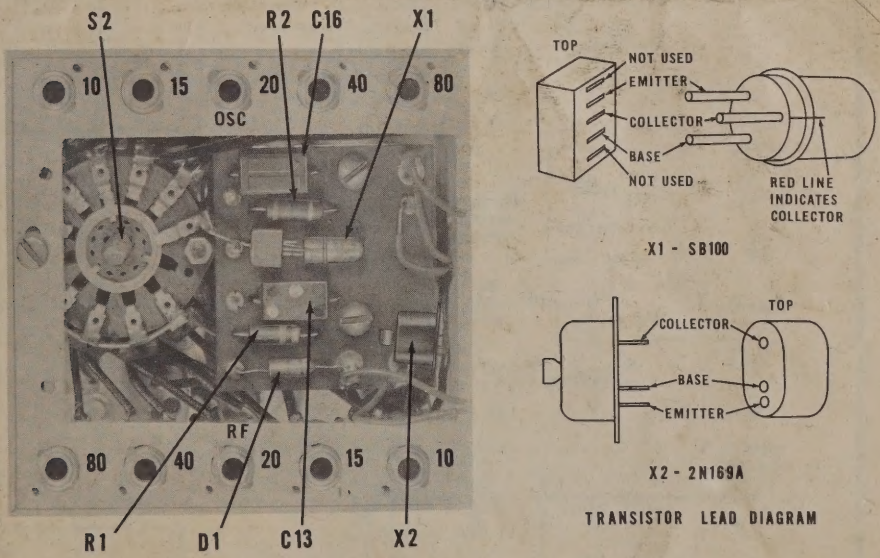


Figure 2. Transistor Replacement (Battery Box Removed)

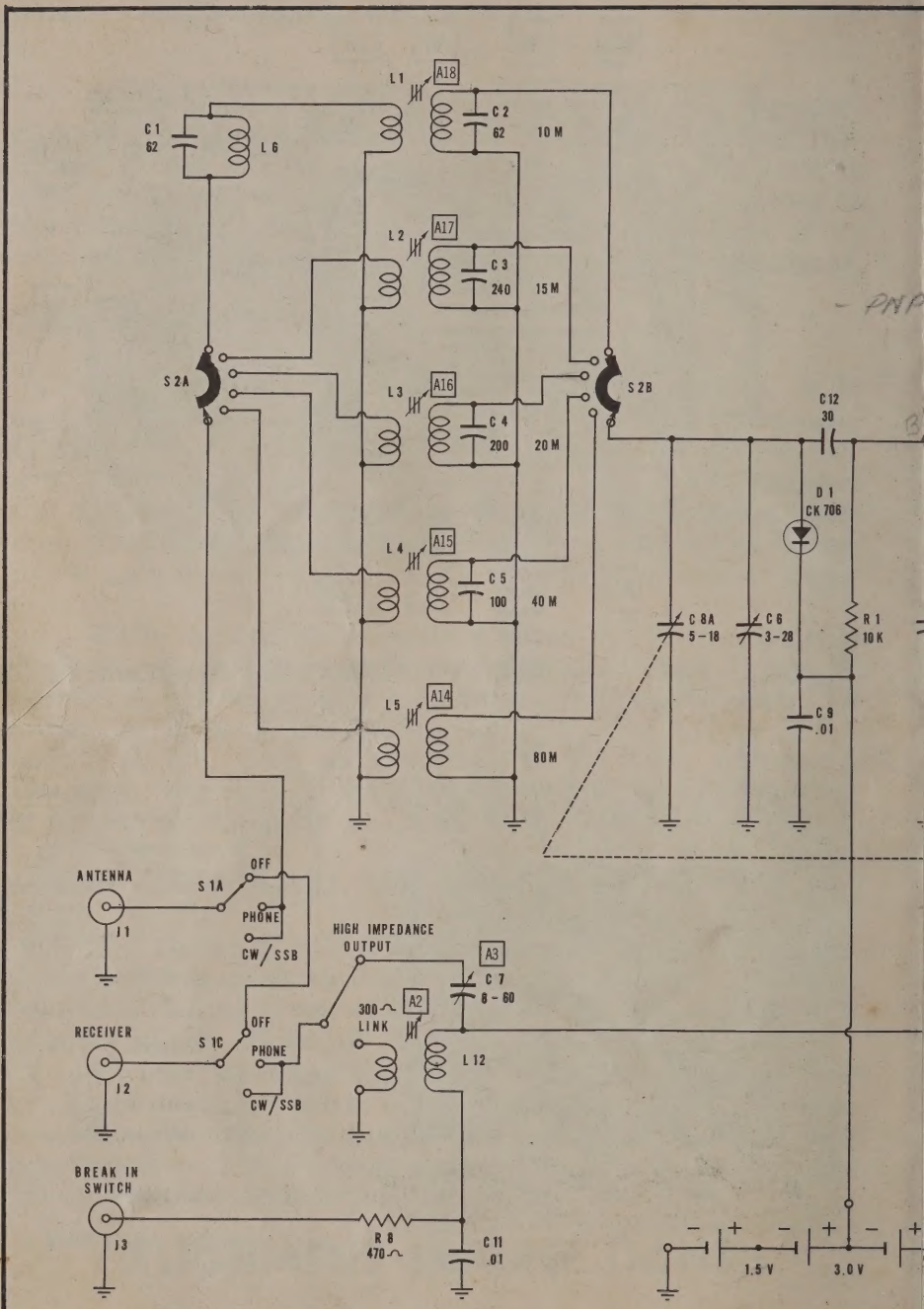
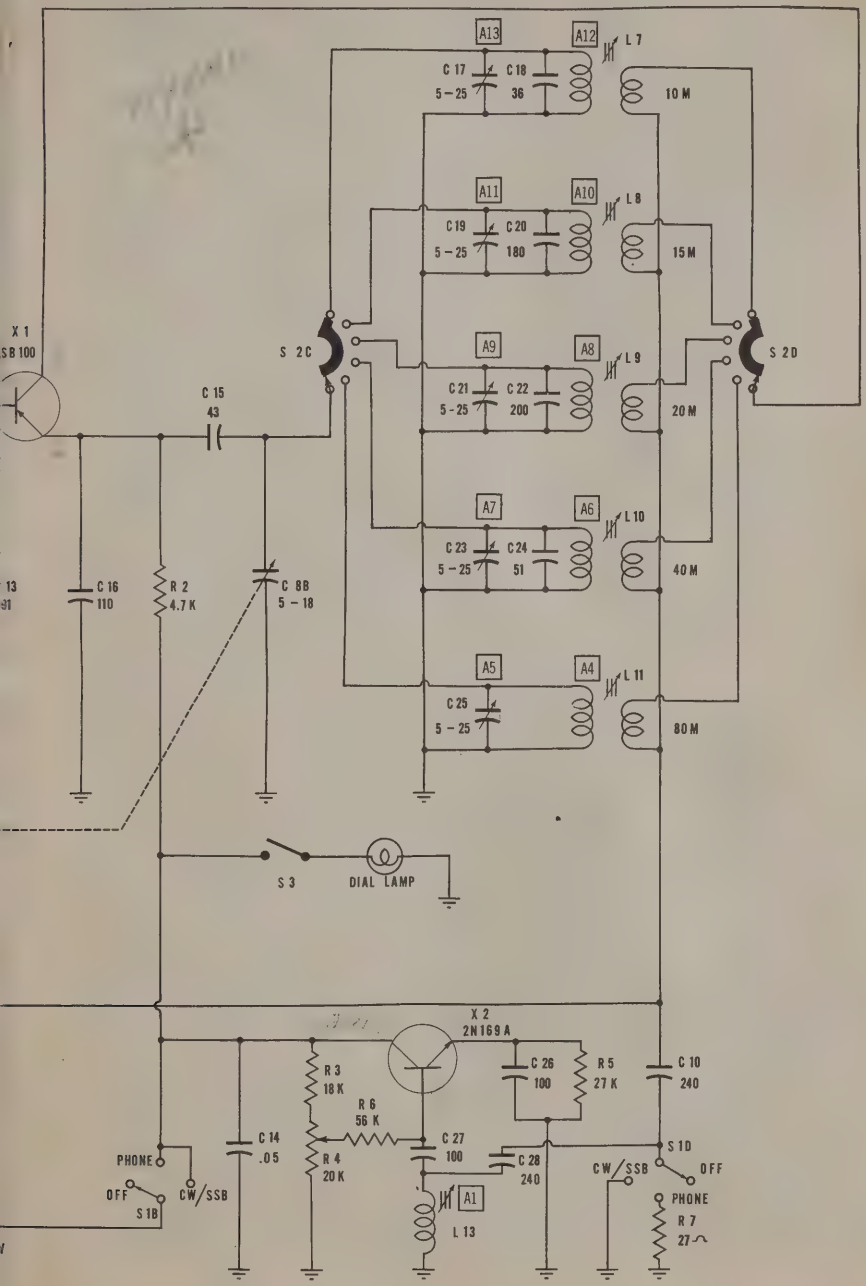


Figure 3. Schema



c Wiring Diagram

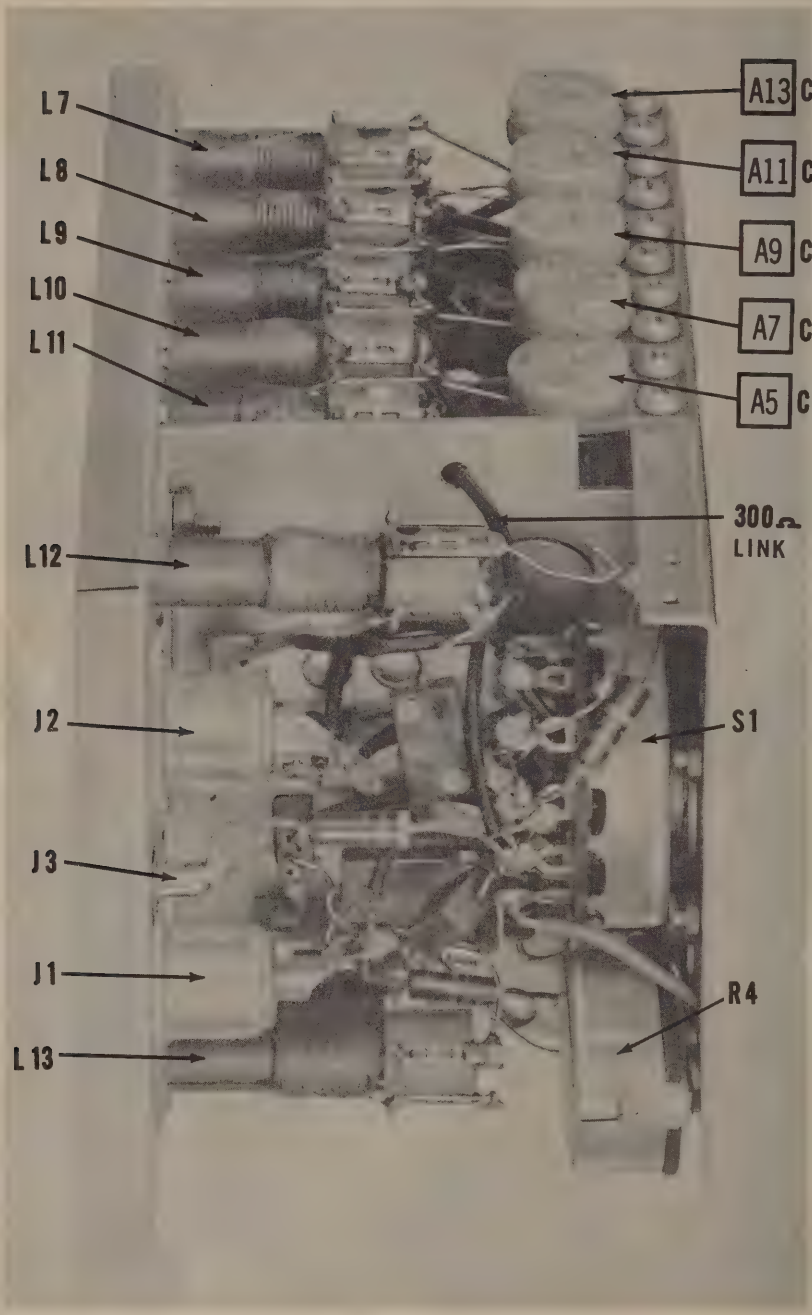


Figure 4. Chassis Top View (Oscillator Capacitor Alignment)

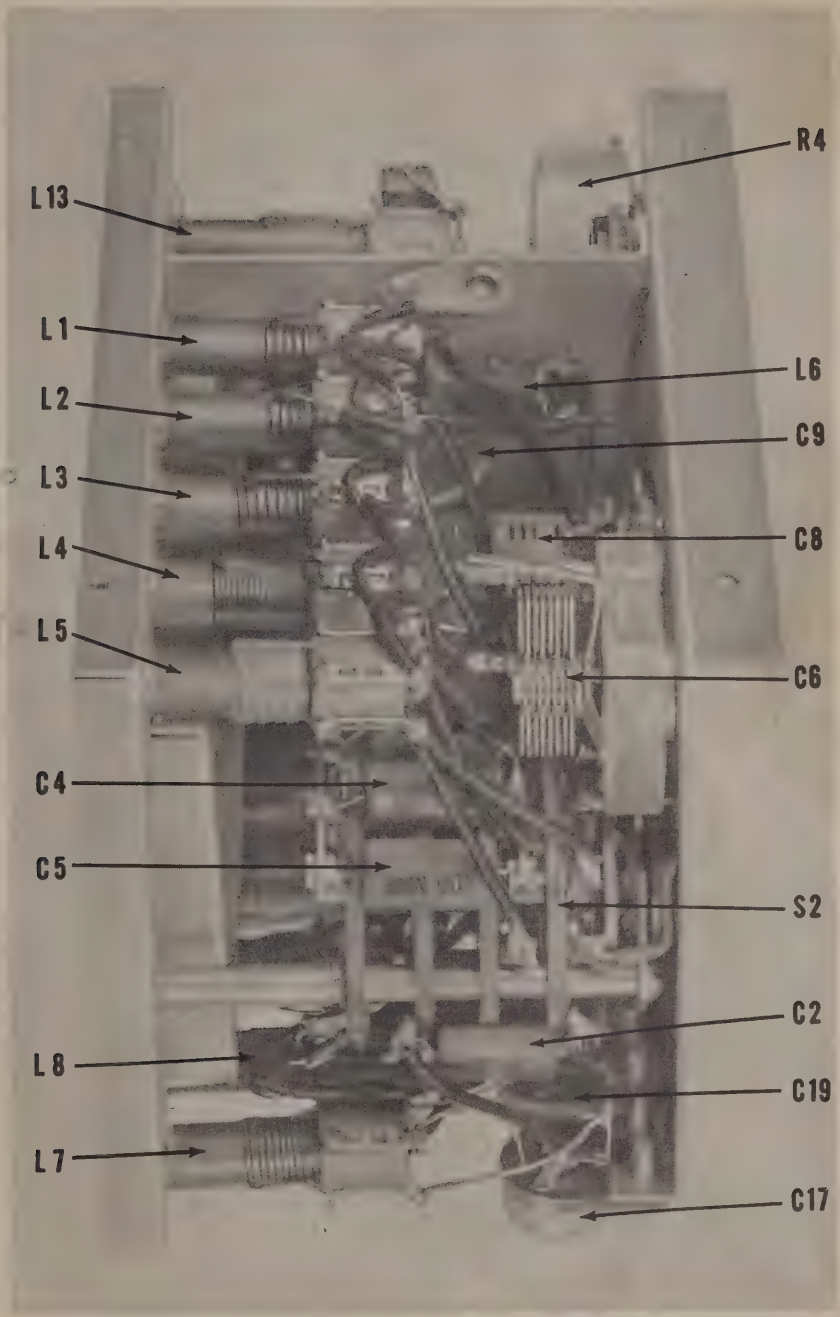


Figure 5. Chassis Bottom View

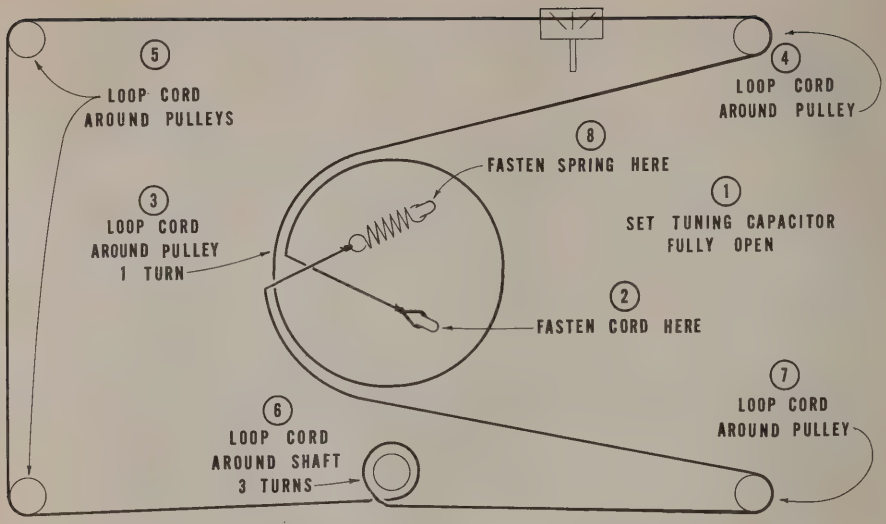


Figure 6. Dial Stringing Diagram - Tuning

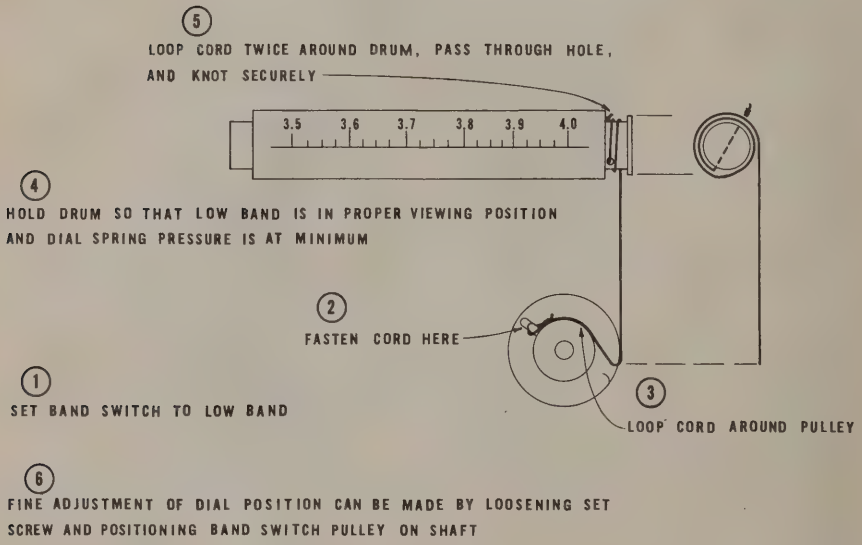


Figure 7. Dial Stringing Diagram - Band Change

PARTS LIST

SEMICONDUCTORS

SYMBOL NO.	DESCRIPTION	TYPE NO.
D1	Clamp Diode	CK-706
X1	Osc. Mod. Transistor	SB-100
X2	BFO/Q Transistor	2N169A

MISCELLANEOUS

SYMBOL	PART NO.	DESCRIPTION
C6	300-576	Miniature Variable Capacitor
C8A-B	300-570	Variable Tuning Capacitor
	GE-1804	Dial Lamp (4 Volt-.06 Amp.)
	100-906-1	Control Knob
	100-906-2	Tuning Knob
	100-939	Front Cover & Window Assembly
	100-940	Chassis Wrap & Mounting Strap Assembly
	100-941	Output Cable - Converter to Receiver
L1	300-611-1	10 Meter R.F. Coil
L2	300-611-2	15 Meter R.F. Coil
L3	300-611-3	20 Meter R.F. Coil
L4	300-611-4	40 Meter R.F. Coil
L5	300-625-1	80 Meter R.F. Coil
L6	100-909	10 Meter Image Trap Coil
L7	300-613-1	10 Meter Oscillator Coil
L8	300-613-2	15 Meter Oscillator Coil
L9	300-613-2	20 Meter Oscillator Coil
L10	300-613-4	40 Meter Oscillator Coil
L11	300-612-1	80 Meter Oscillator Coil
L12	300-614-1	1230 kc I.F. Transformer
L13	300-615-1	1230 kc I.F. BFO/Q Transformer
R4	100-711-2	20K Potentiometer BFO/Q Control
S1	300-579-1	Function Switch
S2	300-571	Band Switch
S3	100-917	Dial Light Switch

CAPACITORS

SYMBOL NO.	DESCRIPTION	TYPE
C1, C2	62 Mmfd-2%	Mica
C3, C10, C28	240 Mmfd-5%	Mica
C4	200 Mmfd-5%	Mica
C5, C26, C27	100 Mmfd-5%	Mica
C7	8-60 Mmfd	Ceramic Trimmer
C9, C11	.01 Mfd-GMV	Disc Ceramic
C12	30 Mmfd-2%	Mica
C13	91 Mmfd-2%	Mica
C14	.05 Mfd-GMV	Disc Ceramic
C15	43 Mmfd-2%	Mica
C16	110 Mmfd-2%	Mica
C17, C19, C21, C23, C25	5-25 Mmfd	Ceramic Trimmer
C18	36 Mmfd-2%	Mica
C20	180 Mmfd-2%	Mica
C22	200 Mmfd-2%	Mica
C24	51 Mmfd-2%	Mica

RESISTORS

SYMBOL NO.	DESCRIPTION
R1	10K Ohm-1/2 Watt-10%-Carbon
R2	4.7K Ohm-1/2 Watt-10%-Carbon
R3	18K Ohm-1/2 Watt-10%-Carbon
R5	27K Ohm-1/2 Watt-10%-Carbon
R6	56K Ohm-1/2 Watt-10%-Carbon
R7	27 Ohm-1/2 Watt-10%-Carbon
R8	470 Ohm-1/2 Watt-10%-Carbon

OSCILLATOR FREQUENCY

The following oscillator frequency data applies for an I.F. output of 1230 kilocycles. All frequencies in megacycles.

BAND	80 Meter		40 Meter		20 Meter		15 Meter		10 Meter	
DIAL	3.5	4.0	7.0	7.3	14.0	14.35	21.0	21.45	28.0	29.7
OSC. FREQ.	4.73	5.23	5.77	6.07	15.23	15.58	9.885	10.11	13.385	14.235

than those covered under SET UP ADJUSTMENTS. Before starting alignment, it is suggested that the following instructions and the service notes be read and observed.

The only equipment required for alignment is a signal generator that can be attenuated and a broadcast receiver. The use of an all-wave receiver and a frequency standard is desirable but not absolutely necessary.

I. F. ALIGNMENT

1. Connect the "REC" jack of the ATC-1 to the antenna input of the receiver using the cable provided. Connect the signal generator to the "ANT" jack. If 1230 kc is not to be used, select a frequency between 1200 kc and 1500 kc, staying as close to 1230 kc as practicable.
2. Rotate the function switch to the "CW/BFO" position.
3. Rotate the "Q MULT/BFO" control to full clockwise.
4. Adjust the iron slug (A1) in "BFO" coil (L13) to the chosen frequency. (Use a fibre or plastic alignment tool for all core adjustments.)
5. Rotate the "Q MULT/BFO" control fully counterclockwise. Peak the "I.F." coil core (A2), keeping the signal generator output as low as convenient.

80 METER BAND ALIGNMENT

1. Remove the four screws which hold the chassis wrap to the front cover and rear panel of the chassis. Loosen the chassis wrap and slide it back until the oscillator trimming capacitors (A5, 7, 9, 11 & 13) are just available at the top of the chassis. In this position the chassis wrap still acts as a shield for the coils.
2. Rotate the band selector to "80".
3. Set "TUNING" for a dial reading of 3.5 mc.
4. Set the signal generator to 3.5 mc and adjust the 80 meter oscillator coil slug (A4) until the signal is heard in the receiver. Keep signal generator output low.
5. Set generator and converter dial to 4.0 mc.
6. Adjust oscillator trimmer (A5) until signal is heard.

7. Repeat steps 4, 5 and 6 until calibration is correct.

40 METER BAND ALIGNMENT

1. Rotate the band selector to "40".
2. Set the dial to 7.0 mc and the signal generator to 7 mc.
3. Adjust the 40 meter oscillator coil (A6) to frequency.
4. Set the dial and the signal generator to 7.3 mc.
5. Adjust oscillator trimmer (A7) to frequency.
6. Repeat steps 2, 3, 4 and 5 until calibration is correct.

20 METER BAND ALIGNMENT

1. Rotate the band selector to "20".
2. Set the dial and the generator to 14.0 mc.
3. Adjust 20 meter oscillator coil core (A8) to frequency.
4. Set the dial and the signal generator to 14.35 mc.
5. Adjust oscillator trimmer (A9) to frequency.
6. Repeat steps 2, 3, 4 and 5 until calibration is correct.

15 METER BAND ALIGNMENT

1. Rotate the band selector to "15".
2. Set the dial and the generator to 21.0 mc.
3. Adjust 15 meter oscillator coil core (A10) to frequency.
4. Set the dial and the generator to 21.45 mc.
5. Adjust oscillator trimmer (A11) to frequency.
6. Repeat steps 2, 3, 4 and 5 until calibration is correct.

10 METER BAND ALIGNMENT

1. Rotate the band selector to "10".
2. Set the dial and the generator to 28.0 mc.
3. Adjust 10 meter oscillator coil core (A12) to frequency.
4. Set the dial and the generator to 29.7 mc.
5. Adjust oscillator trimmer (A13) to frequency.

6. Repeat steps 2, 3, 4 and 5 until calibration is correct. Reassembly the ATC-1 in its case and check the frequency calibration of all bands. Minor shifts in calibration may be expected, but can readily be corrected by slight readjustment of the oscillator cores (A4, 6, 8 10 & 12).

R. F. ALIGNMENT

The adjustment of the R.F. input circuit coils is accomplished by setting the "ANT TRIM" control at the middle of its range (indicator at 12 o'clock) and peaking each of the R.F. coil cores (A14, 15, 16, 17 & 18) to a signal in the respective band. It is suggested that these adjustments be made with the antenna to be used connected to the converter. Alternatively a dummy antenna of 50 to 75 ohms may be used.

SERVICE NOTES

Since the ATC-1 employs transistors which are quickly damaged by excessive current, as might be produced by accidental shorts between parts in servicing operations, it is suggested that all wires and cables be disconnected before using an electric iron or soldering gun.

The transistors should be removed from their sockets (see Fig. 2) before using a continuity meter or ohmmeter in checking circuits. In replacing the transistors, it is important to observe the lead positions shown in Fig. 2.

All the components of the ATC-1 are conservatively designed and are working well below their normal ratings. For these reasons, component life should be extremely long and service failures are expected to be very rare.

Due to the low current levels in the circuit, it is not practical to give voltage data at various points, as the voltage drops would be difficult to read with sufficient accuracy. Resistance checks of the circuit should suffice to indicate any abnormalities.

With regard to replacement of batteries, it will be found that if the dial light operates, when the tuning knob is depressed, the batteries have sufficient energy to operate the converter.

The use of an all-wave receiver will be found of value in checking oscillator performance and operating frequency. (See chart on page 15).

WARRANTY

This converter is sold under the standard RETMA warranty and is warranted to be free from defects in material and workmanship. We agree to remedy any such defect or to furnish a new part in exchange for any part which, under normal installation, use, and service, discloses such defect, provided the unit is delivered to us, intact for our examination, with all transportation charges prepaid to our factory, within ninety days from date of sale to original purchaser, and provided that such examination discloses, in our judgment, that it is thus defective.

This warranty does not apply if the converter has been subjected to misuse, neglect, accidents, incorrect wiring not our own, improper installation, or to use in violation of instruction furnished by us, nor to converters that have been repaired or altered outside our factory.

This warranty excludes all oral or other and implied warranties, and the manufacturer shall in no event be liable for damages for a breach of warranty in an amount exceeding the purchase price of the alleged defective equipment.

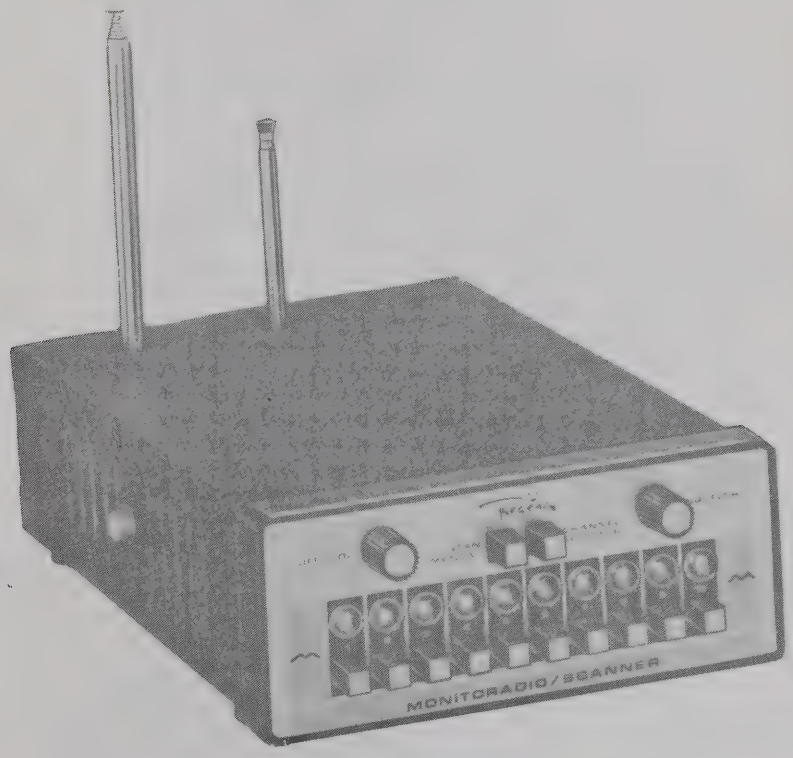
TO PLACE WARRANTY IN FORCE, FILL OUT AND RETURN WARRANTY CARD WITHIN TEN (10) DAYS OF PURCHASE. NO POSTAGE IS REQUIRED.

Regency DIVISION, I.D.E.A., INC.
7900 Pendleton Pike • Indianapolis 26, Indiana

IS-10-082 Printed in U.S.A.

Regency ELECTRONICS INC.

SERVICE MANUAL



MODEL ACT-R10 H/L/U

MONITORADIO RECEIVER

7707 RECORDS STREET
INDIANAPOLIS, INDIANA 46226

PRINTED IN U. S. A
3-75

PRICE $5.00
SM-10-475

MONITORADIO RECEIVER

CONTENTS

SECTION 1 SPECIFICATIONS AND CIRCUIT DESCRIPTION

1-1 Specifications
1-2 Crystal Specifications
1-3 Crystal Installation and Band Programming
1-4 Main Board
1-5 470-500 MHz Operation

SECTION 2 ALIGNMENT AND TUNING PROCEDURE

2-1 Equipment Required
2-2 Quadrature Detector
2-3 IF Alignment
2-4 RF Alignment
2-5 AFC Alignment

SECTION 3 DIAGRAMS, VOLTAGE DATA AND SCHEMATIC

3-1 Main Board Parts Placement Diagram
3-2 Main Board Bottom View
3-3 Main Board Jumper Parts Placement Diagram (Bottom View)
3-4 Light Board Parts Placement Diagram
3-5 Light Board Bottom View
3-6 Voltage Data
3-7 Crystal Location Diagrams
3-8 Schematic (ACT-R 10 H/L/U)

SECTION 4 PARTS LIST

4-1 Main Board
4-2 Light Board
4-3 Chassis Assembly

SECTION 5 SERVICE MANUAL ADDENDUM

5-1 Circuit Changes
5-2 Crystal Installation
5-3 Special Note on AFC Operation
5-4 Alignment and Tuning Procedure
5-5 Diagrams, Voltage Data and Schematic
5-6 Parts List

SECTION 1 SPECIFICATIONS AND CIRCUIT DESCRIPTION

1-1 SPECIFICATIONS (Subject To Change Without Notice)

RECEIVER -MODEL ACT-R 10 H/L/U

Frequency Range	Low Band; 30-50 MHz
	High Band; 150-174 MHz
	UHF Band; 450-470 MHz
Antenna Impedance	50 Ohms
Channels	10, Crystal Controlled
Sensitivity (At Tune-Up)	Low Band; 0.5μv (max.)
	High Band; 0.6μv (max.)
	UHF Band; 0.7μv (max.)
Frequency Separation	
Low Band	6 DB Bandwidth; 33-47 MHz
	10 DB Bandwidth; 30-50 MHz
High Band	6 DB Bandwidth; 8 MHz
	10 DB Bandwidth; 12 MHz
UHF Band	6 DB Bandwidth; 8 MHz
	10 DB Bandwidth; 12 MHz
Selectivity (I.F.)	6 DB Down; ±7 KHz (min.)
	50 DB Down; ±18 KHz (max.)
Spurious Rejection (excluding Primary Image)	50 DB
AFC Range (UHF Band Only)	Approx. ±5 KHz
Modulation Acceptance	±7 KHz (min.)
Intermediate Frequencies	1st I.F. -10.7 MHz
	2nd I.F. -455 KHz
Squelch System	"Noise Operated"
Audio Output (3.2 Ω Speaker)	1 Watt @ 10%, or less,
	Distortion; 2 Watts, maximum

SCANNER

Scan Rate	Approx. 15 Channels per sec.
Scan Delay	Approx. 1/2 sec.

POWER

Voltage Requirement	117 VAC (±10%),
	60 Hz, 13 Watts Max.
	13.8 VDC (±10%)
Current Requirements	@ 13.8 VDC
Receiver (Squelched)	180 MA.
Receiver (Max. Audio Output)	600 MA.
Fuse Size	1.5 Amp., 3AG

SEMICONDUCTORS

Integrated Circuits	5
Silicon Transistors	24
Field Effect Transistors	1
Diode (Total)	29
Zener Diodes	2
Rectifier Diodes	2
Varactor Diode	1

GENERAL

Front Panel Size	6 1/2" x 2 5/8"
Depth (including Knobs and Rear Panel Connectors)	9 3/4"
Antenna Connectors	Motorola Type
Speaker Size	2" x 6", 8 Ohm

1-2 CRYSTAL SPECIFICATIONS

Minature plug-in crystals are utilized in the receiver. Because of the high accuracy (close tolerance) required, Shepherd Industries' crystals are recommended. If the crystals are ordered from Regency, it is only necessary to specify Part No. 301-532 for High Band crystals and the desired receive frequency, or Part No. 301-542 for Low Band crystals and the desired receive frequency, or Part No, 301-603 for UHF (450-470 MHz) crystals and the desired receive frequency, or Part No. 302-187 for UHF (470-500 MHz) crystals and the desired receive frequency.

If desired, the crystals may be purchased from other manufacturers. The following specifications must be included in the order:

High Band Crystal:

a. Crystal frequency, determined as follows:

$$\text{Crystal frequency} = \frac{\text{Channel frequency} - 10.7\ \text{MHz}}{3}$$

EXAMPLE:

$$\text{Crystal frequency} = \frac{155.55\ \text{MHz} - 10.7\ \text{MHz}}{3} = \frac{144.85\ \text{MHz}}{3} = 48.2833\ \text{MHz}$$

b. Frequency Tolerance of .001%
c. 3rd Overtone
d. Series resonance minus 450 Hz
e. Maximum equivalent series resistance of 35 ohms
f. Drive Level of 2 MW
g. Holder: HC-25/U

Low Band Crystal:

a. Crystal frequency, determined as follows:
Crystal frequency = Channel frequency +10.7 MHz

EXAMPLE:
Crystal frequency = 39.5 MHz +10.7 MHz = 50.2 MHz

b. Frequency Tolerance of .001%
c. 3rd Overtone
d. Series resonance minus 450 Hz
e. Maximum equivalent series resistance of 35 ohms
f. Drive Level of 2 MW
g. Holder: HC-25/U

UHF Band Crystal (450-470 MHz):

a. Crystal frequency = $\frac{\text{Receive frequency -10.7 MHz}}{9}$

EXAMPLE:
Crystal frequency = $\frac{458.00 \text{ MHz } -10.700 \text{ MHz}}{9}$

Crystal frequency = 49.70000 MHz

b. Frequency Tolerance of .001%
c. 3rd Overtone
d. Parallel resonance - 18 PF load capacity
e. Maximum equivalent series resistance of 35 ohms
f. Drive Level of 2 MW
g. Holder: HC-25/U

UHF Band Crystal (470-500 MHz):

a. Crystal frequency = $\frac{\text{Receive frequency -10.7 MHz}}{10}$

EXAMPLE:
Crystal frequency = $\frac{485.10 \text{ MHz } -10.7 \text{ MHz}}{10}$

Crystal frequency = 47.44000 MHz

b. Frequency Tolerance of .001%
c. 3rd Overtone
d. Parallel resonance - 18 PF load capacity
e. Maximum equivalent series resistance of 35 ohms
f. Drive Level of 2 MW
g. Holder: HC-25/U

1-3 CRYSTAL INSTALLATION AND BAND PROGRAMMING

Prior to installing a crystal, the receiver's cover will have to be removed. To remove the cover, first remove telescopic antennas if they are installed. Second, unscrew the two large bolts located at the sides of the unit. The cover may then be slipped off by sliding it toward the rear of the unit.

Insert the crystal in the proper socket pins as indicated on the Crystal Location Diagram. See diagram 3-7. The number by each pair of sockets matches the channel number on the front panel.

If the crystal inserted is for the Low VHF Band (30-50 MHz), place the proper color-coded wire and socket onto the proper Low Band pin (row of pins nearest front of unit); if the crystal is for the High VHF Band (148-174 MHz), place the proper color-coded wire onto the proper High Band pin (middle row of pins); if the crystal is for the UHF Band (450-470 MHz), place the proper color-coded wire onto the proper UHF Band pin (row of pins near the rear of set). See Crystal Location Diagram 3-7. Be sure that each channel has its color-coded wire programmed properly with respect to crystal installed. Reading from left to right (Channel 1 through 10), the color-coded wires should be in the order of brown, red, orange, yellow, green, blue, purple (or violet), pink, white and black.

NOTE: If a particular channel is not used (in other words, there is no crystal installed for that channel), the band selection wire must still be connected to either a High Band, a Low Band pin or to a UHF Band pin. Thus, for proper scanner operation, all of the band selection wires MUST be connected, even though not all channels are used.

As shipped from the factory, the first three channels are programmed for Low Band, the next four (channels 4 through 7) are programmed for the High Band and the last three (channels 8 through 10) are programmed for the UHF Band. If desired, this arrangement can be changed to any combination of High, Low or UHF Band channels.

After the crystals are installed and any necessary band programming changes are completed, reinstall the cover.

1-4 MAIN BOARD

Q101 is a Low VHF Band RF amplifier with broad-band tuned circuits in its input and output circuitry. The output of the RF amplifier is coupled to the input of the Low VHF Band mixer, Q102.

Q103 is a High VHF Band RF amplifier with broad-band circuits in its input and output circuitry. The output of the RF amplifier is coupled to the input of the High VHF Band mixer, Q104.

Q105 is the UHF Band Field Effect RF transistor used in the common gate configuration. Q105 has broad-band tuned circuits in its input and output circuitry. The output from the RF amplifier is coupled to the input of the UHF Band mixer, Q106.

The first L.O. (local oscillator), Q107, uses third overtone crystals and operates on all channels, whether High, Low or UHF. For Low VHF Band signals, the fundamental frequency of the crystal is taken off the Emitter of Q207 for injection. For High VHF Band signals, the third harmonic of the crystal is coupled off the collector of Q107 for oscillator injection. For UHF Band signals, the third harmonic of the crystal is coupled off the collector circuitry of Q107 and is coupled to the base of Q108. Q108 is a tripler which multiplies the 3rd harmonic of the oscillator by three for use as the ultimate injection frequency. The radio is switched between Low VHF Band, High VHF Band and UHF Band by transistors Q113, Q114 and Q115. When Q113 is conducting, operating bias is applied to Low VHF Band RF amplifier and mixer. When Q114 conducts, operating bias is applied to High VHF Band RF amplifier and mixer. When Q115 conducts, operating bias is applied to the UHF Band oscillator - multiplier, AFC circuitry and mixer. Conduction of Q115, Q114, and Q113 is determined by the Band Programming pins. A pin for each particular channel is connected to either the Low, High or UHF row of pins. When that particular channel is scanned the Low, High or UHF section is turned on depending on the band programming.

A crystal is electrically connected to the oscillator circuit when its associated diode is forward biased. Until the scanner reaches that particular channel, the diode is back biased and prevents the oscillator from operating on the crystal's frequency. When the respective channel is reached, the scanner's output line provides a low resistance path to ground. which turns the diode on (forward biases it) and effectively connects the crystal into the oscillator circuit.

The automatic frequency control circuit (AFC), UHF Band only, consists of Q109, Q110, Q111 and CR111. Q110 and Q111 form a differential amplifier. The voltage at pin 1 of IC102 is determined by the amount the signal is off frequency; this is called an error voltage. The error voltage is amplified by Q109 and applied to CR111. CR110 is a voltage dependent capacitor, or varactor, in the oscillator circuit. When the voltage applied to CR111 changes, the frequency of the oscillator is changed.

The second L.O. frequency is normally 10.245 MHz. In cases where interference is encountered from a signal approximately 910 KHz from the desired frequency, the second L.O. may be changed to 11.155 MHz. If the second L.O. is 10.245 MHz, the error voltage is taken from the collector of Q111. If the second L.O. has been changed to 11.155 MHz, the error voltage is taken from the collector of Q109. The correct combination can be determined by checking the frequency stamped on the second L.O. crystal, (Y111).

The output frequency from the first mixers is 10.7 MHz, the first IF frequency. It is filtered by L122, L123 and L124 before it is fed to an Integrated circuit IC101, which contains the second mixer circuitry and the second L.O. circuitry, normally operating at 10.245 MHz. In some locations where a strong Image signal has been encountered, this oscillator's frequency is moved to 11.155 MHz. (The crystal frequency is stamped on the top of the crystal).

The 455 KHz output of IC101 (terminal 5) is coupled through a tuned circuit to the input of the ceramic filter, CF101. CF101 is a narrow-band filter centered at 455 KHz. The excellent bandpass characteristics of CF101 provode for very good adjacent channel rejection. The output of CF101 is amplified by Q116 and coupled through another tuned circuit to the input of Integrated circuit IC102. IC102 is a series of amplifiers providing approximately 60 DB gain at 455 KHz. Also included in IC102 is the limiting circuitry and a Quadrature Detector circuit. L128, connected between terminals 2 and 12 of IC102, is the adjustable Quadrature coil.

The audio output from IC102 (terminal 1) is coupled to the input of the audio amplifier circuit and to the input of the noise-operated squelch circuit.

Transistor Q117 is an amplifier whose frequency response extends from approximately 5 KHz to 25 KHz. Q117 amplifies the "noise" occuring in this frequency range. The noise is coupled to the base of Q118. Q118 is used as a detector which rectifies the amplified noise and produces a DC voltage at its collector. When the DC voltage at the collector of Q118 is positive and of sufficient value to provide base bias for Q119, Q119 turns off and removes forward bias from diode, CR113 and leaves it back biased. This action prevents audio from reaching the speaker and the receiver is squelched (muted). When a signal (carrier) arrives, the output from the detector Q118 is reduced to the point where the DC voltage at the base of Q119 is no longer sufficient to cause Q119 to conduct.

At this time, CR113 is forward biased and allowed to conduct normally and the audio output of the unit is heard. Audio is applied through the volume control to IC103. IC103 is an Integrated circuit containing a power audio amplifier, gain is internally fixed at 34 DB or 50 times and the output is short circuit proof with internal thermal limiting. The output of IC103 is connected to an 8 ohm internally mount4d speaker. An external speaker can be connected to the unit, no less than a 8 ohm speaker is recommended for optimum performance.

The squelch tail circuit consists of R184, CR112, C170 and R185. This circuit is used to keep the squelch circuit open for a short time after the station signal goes off. The purpose of the squelch tail circuit is to prevent the squelch circuits from chopping very weak signals, especially mobile signals. The timing of the squelch tail can be changed by changing the value of C170. Removing C170 from the circuit will remove the squelch tail completely.

Five basic functional circuits make up the Scanner system. They are: a 4-bit binary counter, a binary coded decimal to one of ten decoder/driver, a lamp detector, a three-speed clock and a clock inhibitor.

The 4-bit binary counter (IC104) has four outputs (pins 8, 9, 11 and 12) and two inputs. One of the inputs (pin 1) accepts clock pulses and the other one (pin 14) accepts pulses from pin 11 of the counter. The counter counts the clock pulses (up to 16) and provides a binary-coded decimal (BCD) output for each input pulse. This is basically accomplished by having four divide-by-two sections (Flip-Flops) interconnected in a series circuit.

There is a specific combination, in a binary form, of these counter outputs for each channel. The Decoder/Driver (IC105) converts the BCD information into decimal configuration (0 through 9) and provides the "Low" output necessary to turn on the channel lamp and diode switch for the crystal. Only one Decoder/Driver output is low at any one time; all other outputs are "high" or near the supply voltage.

The duration for the lamp to be on is dependent upon the position of the channel switch and the Scan/Manual switch. If the channel switch is set to the "OUT" position, the lamp does not light at all and the Lamp Detector (Q120) remains cut off (no collector current). The clock runs at its FAST speed (approximately 1200 Hz) and the receiver's oscillator and squelch circuits can not react quickly enough to stop on that channel even if a RF signal were present.

If the channel switch is in the "IN" position, the channel lamp lights and the Lamp Detector (Q120) conducts, forcing the clock to run at its NORMAL (approximately 15 Hz) scan speed. Thus, the lamp is on long enough to reach normal illumination and the receiver's oscillator and squelch circuits can react quickly enough during this relatively long period of time to an incoming RF signal. It should be noted that the Clock runs at its FAST speed except when scanning through an active channel. In other words, until the Lamp Detector (Q120) determines that a channel lamp is drawing current, the Clock is operating in its FAST mode and it does not slow down to its NORMAL scan speed until it actually is partly into an active (lamp lit) channel.

When an RF signal is present, squelch is "broken" and a positive voltage is fed to the Clock Inhibitor (Q121) which then stops the clock from running. Thus, as long as an RF signal (carrier) is present, the clock is stopped and the Counter is not operative. After the RF signal is gone, a delay to the Clock starting again is provided by capacitor C179. This delay permits a short interval of a "stopped" clock so that another RF signal responding to the first signal (for example a mobile replying to the base station) can come on channel without the scanner going through all of the other channels first.

The Clock (pulse generator) circuitry is primarily a unijunction oscillator. Its basic speed (frequency or period) is determined by R197 and C181, which is the FAST speed. Its NORMAL speed is determined by R197, C180 and C181. When Q122 is turned on (Q121 turned off, Q120 turned on), C180 is effectively added to the timing circuit of the clock, forcing it to run much slower (approximately 15 Hz).

The Clock Inhibitor, Q121, stops the Clock when it is conducting and its collector goes low (near ground). This provides a low voltage path to ground for the Emitter of the unijunction (Q123). When the Emitter of Q123 is below a certain value, the unijunction ceases to oscillate. It can be considered a solid-state version of the relaxation type oscillator.

For normal scanning operating, the Scan/Manual switch connects the carrier delay capacitor (C179) to the Clock Inhibitor's collector circuit. For manual operation,

C179 is connected in parallel with C180. Also, fixed voltage is applied to the base of Q121 which is turned on (conducting), thus stopping the Clock. The when the Step switch is pushed in, it removes this fixed voltage from Q121's base, permitting the Clock to run. However, with C180 and C179 in parallel, the Clock will now run at approximately 2 Hz, which is the SLOW or manual stepping scan rate. Upon release of the Step switch, the Clock Inhibitor (Q121) is again forced to stop the Clock. Pushing in the Scan/Manual switch will automatically let the Clock run again at its proper scan rate.

1-5 470-500 MEGAHERTZ OPERATION

This unit can be retuned to cover an eight Megahertz segment of the 470-500 MHz band. The major difference is that the crystal frequency is determined by taking the channel frequency minus 10.7 MHz and dividing by ten (REFER to Section 1-2, CRYSTAL SPECIFICATIONS). This allows for L119 (injection coil for the High VHF Band) and drive coil for the UHF tripler, (Q108), not to be retuned and therefore, not affecting High VHF Band sensitivity. C139, the UHF Band injection tuning capacitor, is tuned to 10th harmonic of the crystal. Tuning procedure for 470 to 500 MHz operation is the same as in the UHF Section alignment, see Section 2-4 RF Alignment.

SECTION 2 ALIGNMENT AND TUNING PROCEDURE

2-1 EQUIPMENT REQUIRED

2-1-1 FM Signal Generator
2-1-2 Oscilloscope
2-1-3 AC VTVM

NOTE: During all steps of alignment, the squelch control should be in the maximum clockwise position (minimum squelch action).

All receivers should be aligned to the channel nearest the center of the frequency range in the band over which they will operate.

2-2 QUADRATURE DETECTOR

2-2-1 Connect the FM Signal Generator to the H/L antenna input jack. Accurately set the frequency to the center of the channel being used for alignment. Modulate Signal Generator with 1000 Hz, 3 KHz deviation.

2-2-2 Connect the oscilloscope to Junction of C162, C163 and R172.

2-2-3 Adjust Signal Generator's output until all of the noise in the scope pattern just disappears.

2-2-4 Adjust L128 for maximum peak to peak amplitude, while maintaining symmetry of the detected signal. When L128 is properly aligned, signal at above Junction should be approximately 0.2 volts RMS with test signal input as noted in 2-2-1.

2-3 IF ALIGNMENT

2-3-1 Pre-Set the cores of L122, L123 and L124 9 turns in from the outer end of the coil form.

2-3-2 Connect AC voltmeter to the Junction of R167 and the collector of Q116.

2-3-3 Set AC voltmeter to the 300 millivolts scale.

2-3-4 With generator accurately set to the frequency of the center of the channel being used for alignment, increase Signal Generator's output until AC voltmeter reading is mid-range.

2-3-5 Adjust L122, L123 and L124 (in that order) for maximum AC voltmeter reading. Readjust Signal Generator's output to main-

tain voltmeter reading approximately in the mid-range. Repeat adjustment until no further improvements can be made.

2-4 RF ALIGNMENT

LOW BAND SECTION

2-4-1 Pre-Set the cores of L102 and L103 one turn from the outer ends of the coil form. (NOTE: Due to the broadness of the Low Band Section, presetting the above cores will give you optimum performance over the entire band).

HIGH BAND SECTION

2-4-2 Connect AC voltmeter to the Junction of R167 and the collector of Q116.

2-4-3 Set AC voltmeter to the 300 millivolts scale.

2-4-4 Activate High Band channel nearest to center of High Band frequencies being used.

2-4-5 With Signal Generator accurately set to the frequency of the center of the channel being used for alignment and connected to H/L antenna input jack, increase Signal Generator's output until AC voltmeter reading is mid-range.

2-4-6 Adjust L119, L104, L105 and L106 (in that order) for maximum AC voltmeter reading. Readjust Signal Generator's output ot maintain voltmeter reading approximately in the mid-range. Repeat adjustment until no further improvements can be made.

NOTE: Adjustment to L119 of one or more turns may require UHF Section to be realigned.

UHF BAND SECTION

2-4-7 Connect AC voltmeter across the speaker terminals.

2-4-8 With Signal Generator output reduced to zero, adjust the volume control until AC voltmeter reads 1.0 volt of noise.

2-4-9 Activate UHF channel nearest to center of UHF frequencies being used.

2-4-10 Set Signal Generator accurately to the channel being used and adjust output of Signal Generator until AC voltmeter reads .2 volts.

2-4-11 Adjust trimmers C121, C122 and C139 (in that order) for maximum quieting (lowest meter reading). Adjust the Signal Generator output to maintain voltmeter reading between .1 and .2 volts. Repeat adjustments until no further improvements can be made.

NOTE: 1) Use non-metallic screwdriver for trimmer adjustments. 2) L119 is tuned in High Band alignment. If the UHF section sensitivity is down, a readjustment to L119 may be necessary. If more than a turn one way or the other is necessary, repeat High Band alignment.

2-5 AFC ALIGNMENT

NOTE: This adjustment requires an accurate 10.7 MHz ±1 KHz oscillator or 455 KHz ±500 Hz oscillator to be used as a reference signal. If none are available, proceed to Step 2-5-4.

2-5-1 With a coupling loop, inject "Reference" signal (either 10.7 MHz or 455 KHz) to produce good quieting (more than 30 DB quieting). Adjust R147 for reading of 3.8 to 4.0 volts at the collector of Q109.

2-5-2 Remove the "Reference" signal and have the unit squelched and receiving no signal. The voltage on the collector of Q109 shall be between 3.2 and 4.6 volts. If not, note voltage and proceed to Step 2-5-3. If voltage is between 3.2 and 4.6 volts, AFC alignment is complete.

NOTE: Any further adjustments made to L128 and R147 will require AFC to be re-adjusted.

2-5-3 Inject "Reference" signal and monitor voltage on collector of Q109. Adjust L128 for same voltage as noted in Step 3. Readjust R147 for a voltmeter reading of 3.8 to 4.0 volts. Repeat Step 2-5-2.

NOTE: Do not adjust L128 more than 1/4 turn at a time.

2-5-4 If an accurate I.F. signal source is not available, an approximate AFC alignment can be made by adjusting L128 on a High Band or Low Band crystal as specified in Quadrature Detector Alignment (Section 2-2), and with the unit squelched and receiving no signal, adjust R147 for voltmeter reading of 3.2 to 4.6 on the collector of Q109.

NOTE: Units equiped with a 10.245 MHz crystal have the jumper in the AFC circuit connected between the base of Q109 and collector of Q111. When a 11.155 MHz crystal is used, the jumper is connected between the base of Q109 and the collector of Q110. If the crystal is changed from one frequency to the other, the jumper must be changed.

SECTION 3 DIAGRAMS, VOLTAGE DATA AND SCHEMATIC

3-1 MAIN BOARD PARTS PLACEMENT DIAGRAM

3-2 MAIN BOARD BOTTOM VIEW

3-3 MAIN BOARD JUMPER PLACEMENT (BOTTOM VIEW) DIAGRAM

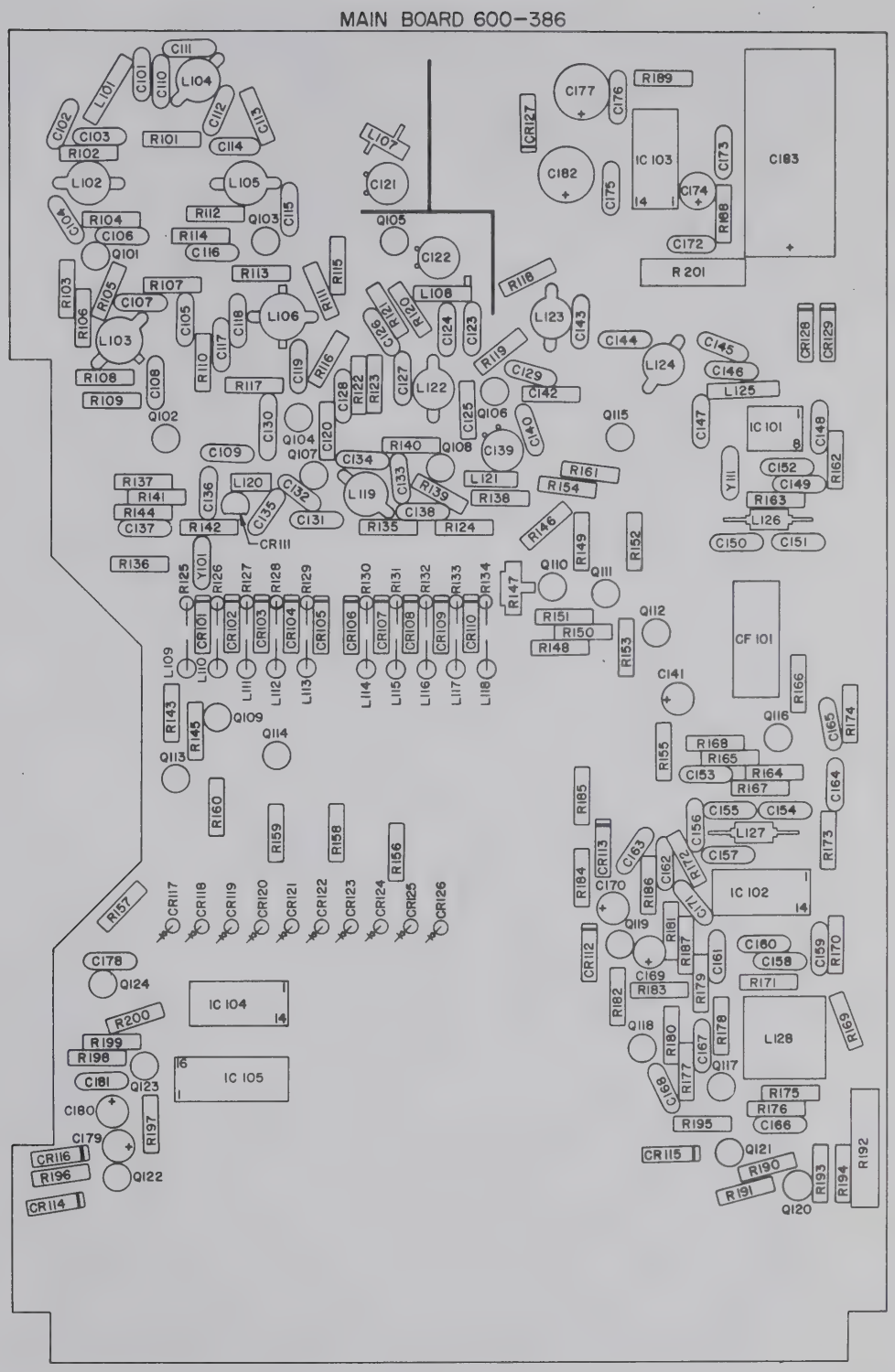
3-4 LIGHT BOARD PARTS PLACEMENT DIAGRAM

3-5 LIGHT BOARD BOTTOM VIEW

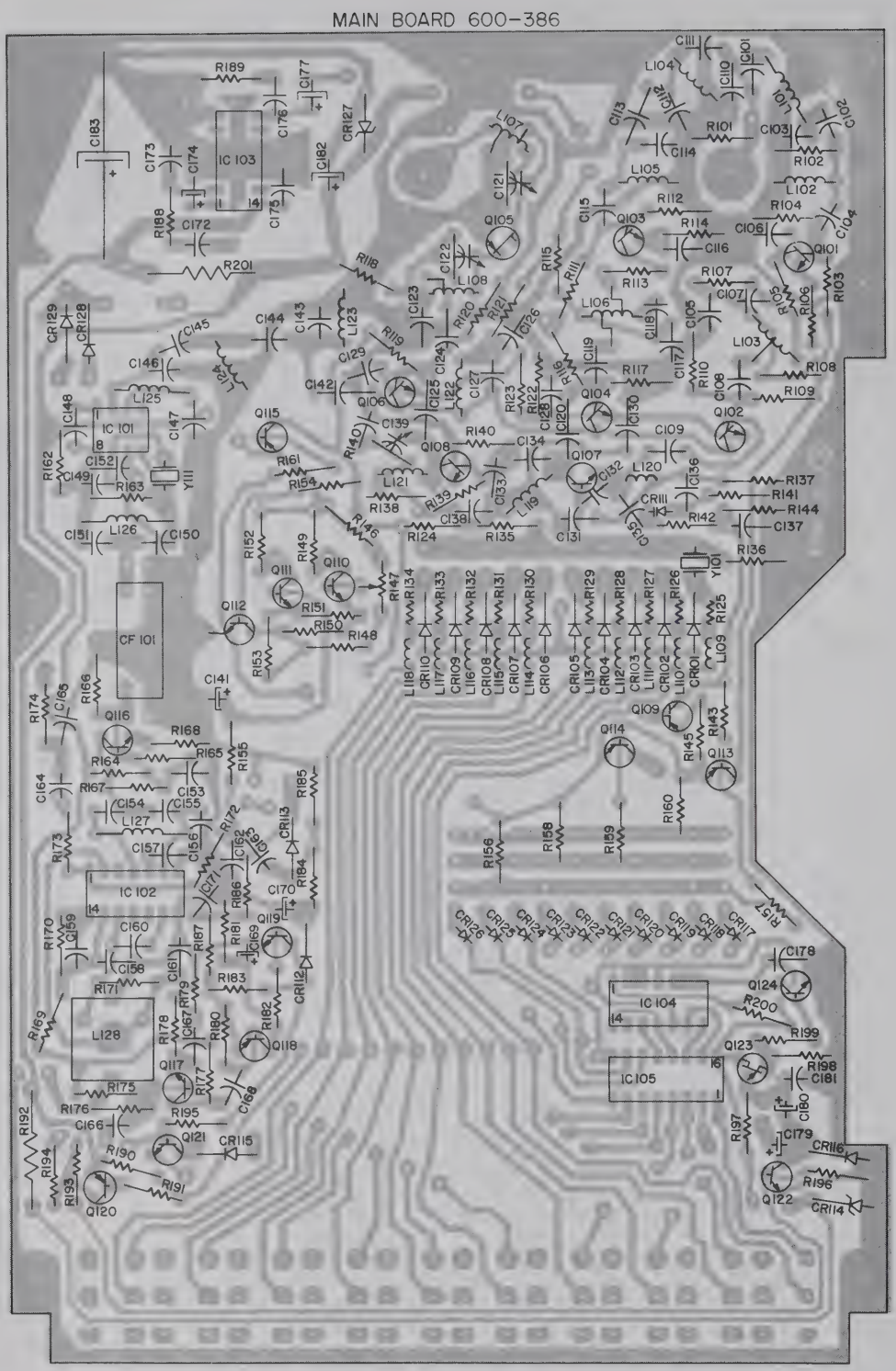
3-6 VOLTAGE DATA

3-7 CRYSTAL LOCATION DIAGRAM

3-8 SCHEMATIC

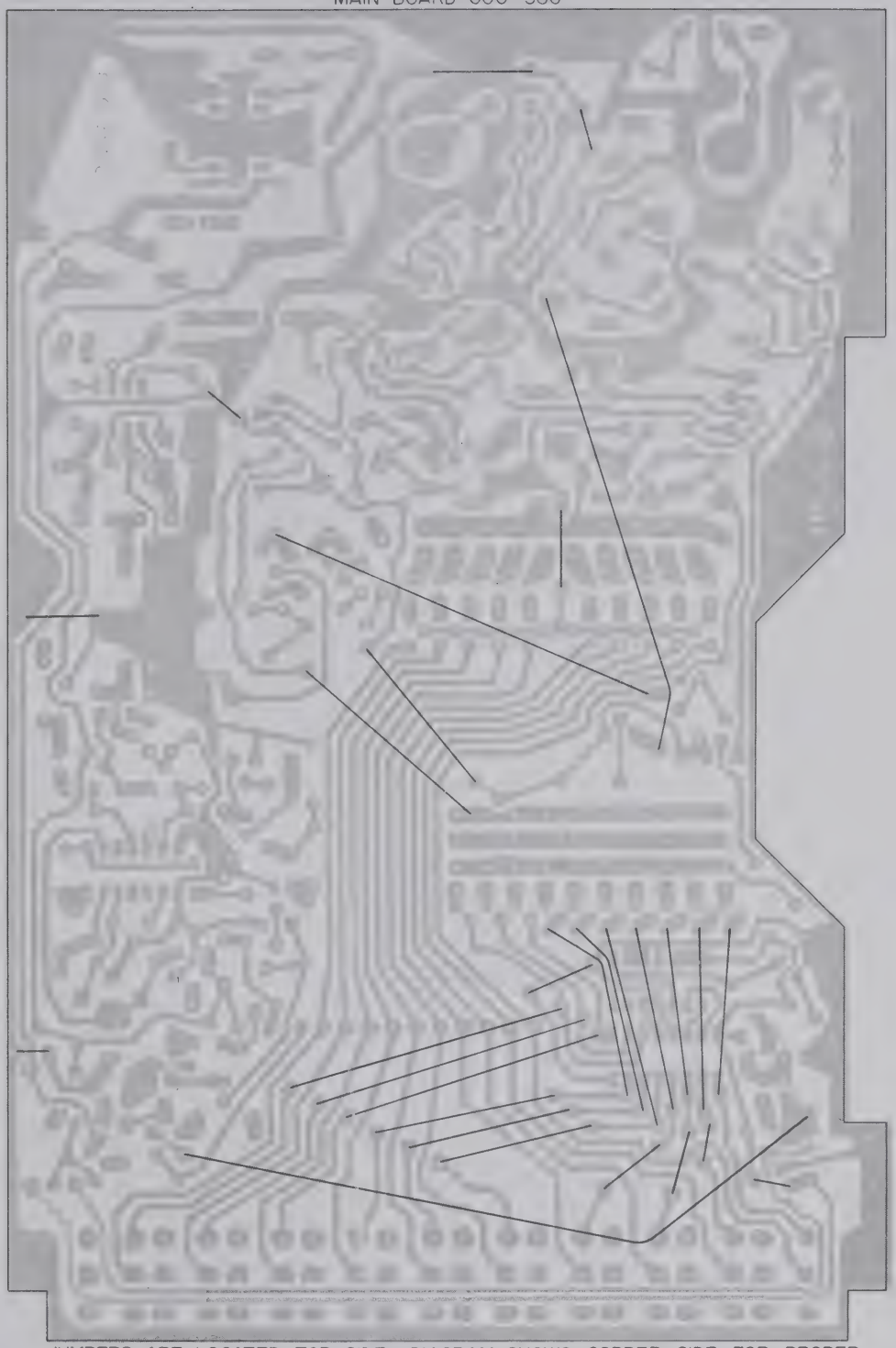


3-1 MAIN BOARD PARTS PLACEMENT DIAGRAM



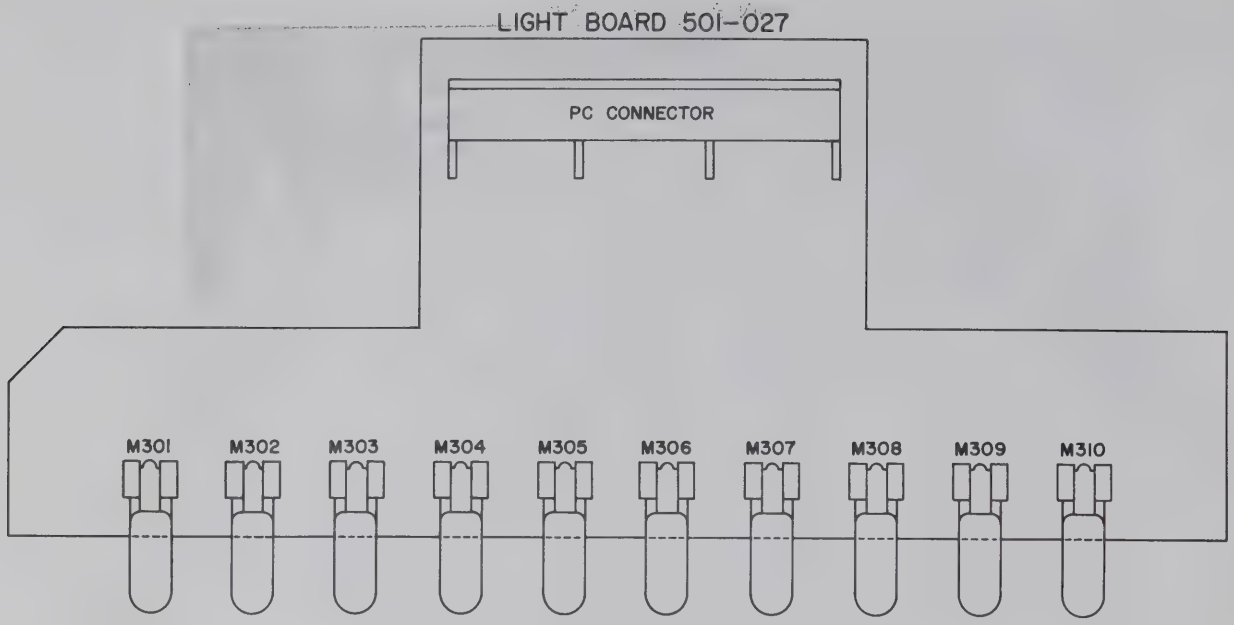
3-2 MAIN BOARD BOTTOM VIEW

MAIN BOARD 600-386

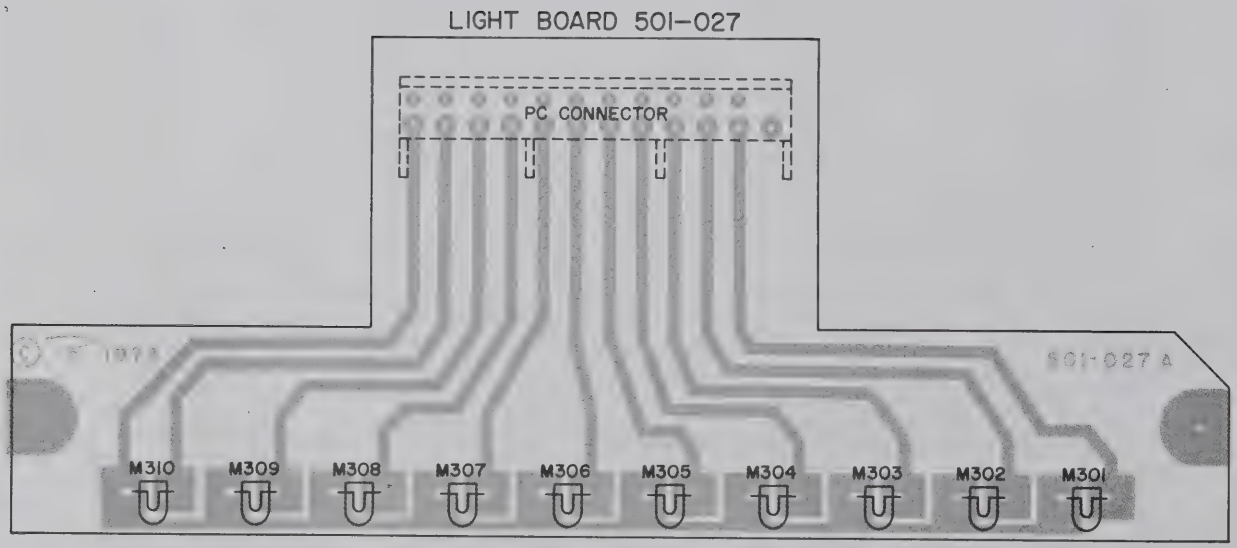


JUMPERS ARE LOCATED TOP SIDE. DIAGRAM SHOWS COPPER SIDE FOR PROPER CONNECTIONS.

3-3 MAIN BOARD JUMPER PLACEMENT (BOTTOM VIEW) DIAGRAM



3-4 LIGHT BOARD PARTS PLACEMENT DIAGRAM



3-5 LIGHT BOARD BOTTOM VIEW

3-6 VOLTAGE DATA

NOTE: All voltages are nominal and are measured with a VTVM. SCAN indicates the unit is scanning. MAN indicates the unit is not scanning and is stopped at channel 1. A "P" beside a voltage indicates that the meter reading is pulsating (fluctuating) because the scanner section of the unit is operating.

VOLTAGE DATA – SEMICONDUCTORS:

TRANSISTOR	EMITTER (Source)	BASE (Gate)	COLLECTOR (Drain)	
Q101	3.1	3.8	7.0	Low Band Activated
	0	0	0	High Band Activated
	0	0	0	UHF Band Activated
Q102	1.6	2.3	7.7	Low Band Activated
	1.6	0	7.7	High Band Activated
	1.4	0	7.7	UHF Band Activated
Q103	0	0	8.2	Low Band Activated
	3.1	3.8	7.9	High Band Activated
	0	0	8.2	UHF Band Activated
Q104	1.6	0	7.7	Low Band Activated
	1.6	2.3	7.7	High Band Activated
	1.4	0	7.7	UHF Band Activated
Q105 (FET)	0	0	6.0	
Q106	1.6	0	7.7	Low Band Activated
	1.6	0	7.7	High Band Activated
	1.6	2.3	7.7	UHF Band Activated
Q107	3.7	4.4	7.4	No Crystal
	3.4	4.0	7.4	With Crystal
Q108	0	0	0	Low High Band Activated
	0	.4	8.1	UHF Band Activated (No Crystal)
	0	.1	4.0	UHF Band Activated (With Crystal)
Q109 (PNP)	8.1	8.1	.8	Low Band Activated
	8.1	8.1	.8	High Band Activated
	7.9	7.2	3-5	UHF Band Activated
Q110	8.2	8.2	8.2	Low Band Activated
	8.2	8.2	8.2	High Band Activated
	2.9	3.6	7.2	UHF Band Activated
Q111	8.2	8.2	4.0	Low Band Activated
	8.2	8.2	4.0	High Band Activated
	2.9	3.6	7.4	UHF Band Activated
Q112	0	0	8.2	Low Band Activated
	0	0	8.2	High Band Activated
	0	.7	.1	UHF Band Activated

VOLTAGE DATA (CONTINUED)

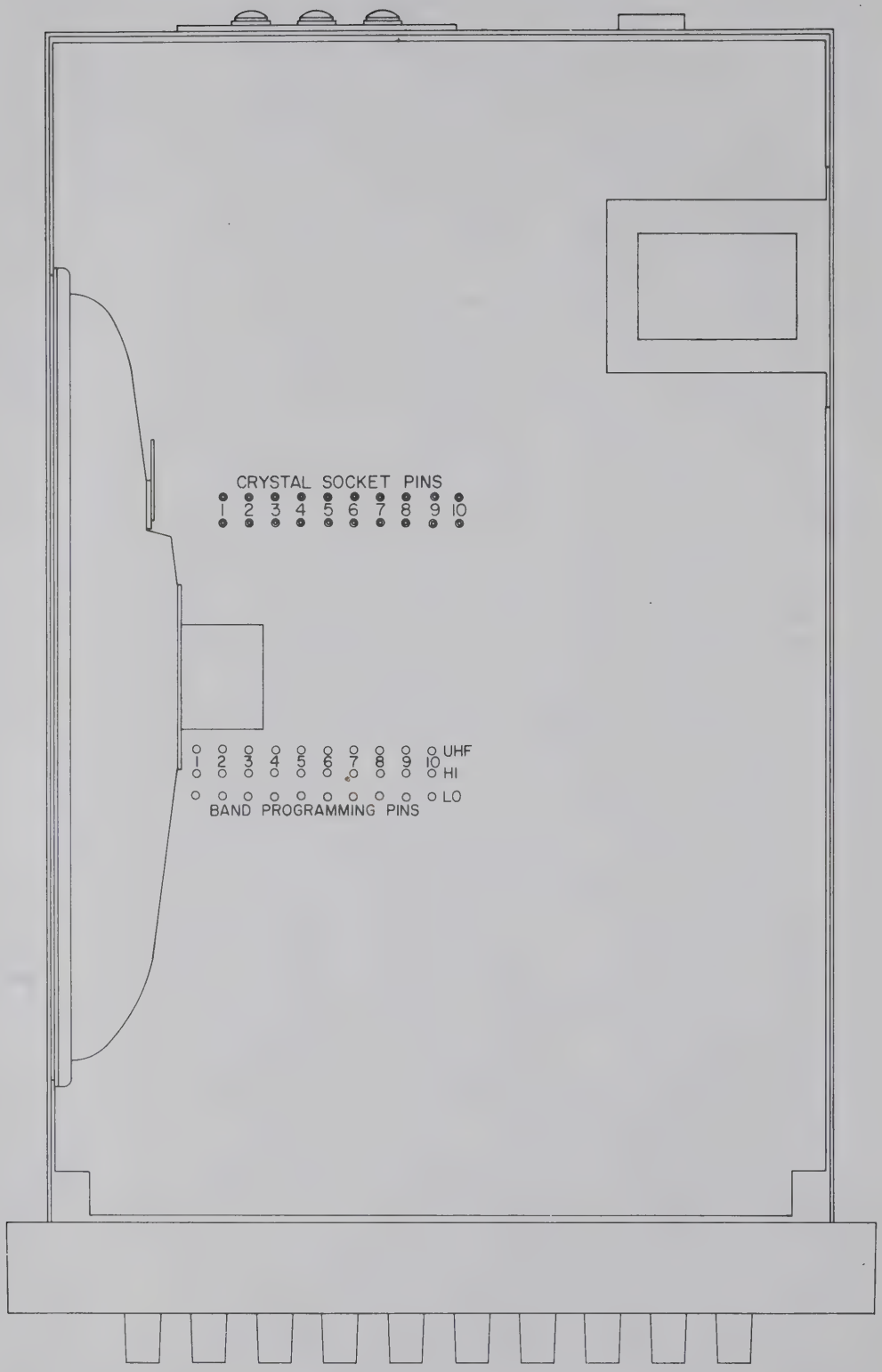
TRANSISTOR	EMITTER (Source)	BASE (Gate)	COLLECTOR (Drain)	
Q113 (PNP)	8.2	7.5	8.1	Low Band Activated
	8.2	8.2	0	High Band Activated
	8.2	8.2	0	UHF Band Activated
Q114 (PNP)	8.2	8.2	0	Low Band Activated
	8.2	7.5	8.1	High Band Activated
	8.2	8.2	0	UHF Band Activated
Q115 (PNP)	8.2	8.2	0	Low Band Activated
	8.2	8.2	0	High Band Activated
	8.2	7.5	8.1	UHF Band Activated
Q116	0.4	1.1	4.5	
Q117	1.0	1.7	5.0	
Q118	8.2	8.2	0	(Unsquelched)
	8.2	8.2	1.0	(Squelched)
	8.2	8.2	1.5	Min. (Tight Squelched)
Q119	0	0	7.2	(Unsquelched)
	0	0.8	0.2	(Squelched)
	0	0.8	0.1	(Tight Squelched)
Q120	13.8	13.1	13.6	(SCAN)
	13.8	13.1	13.6	(MAN)
	13.8	13.8	0	(No Lights)
Q121	0	0	4.0	(SCAN)
	0	0.8	0.1	(MAN)
Q122	0	0.8	0.1	
Q124	0	.2	4.9	(SCAN)
	0	.2	5.1	(MAN)
	BASE 1	**EMITTER**	**BASE 2**	
Q123	0.2	3.8	5.1	(SCAN)
(Unijunction)	0.2	0.5	5.1	(MAN)
	CATHODE	**ANODE**		
CR113	1.8	2.4		(Unsquelched)
	1.0	0		(Squelched)

VOLTAGE DATA (CONTINUED)

INTEGRATED CIRCUITS

NOTE: A "P" beside a voltage indicates that the meter reading is pulsating (fluctuating) because the scanner section of the unit is operating. MAN indicates the unit is not scanning and is at channel 1 (M301 is lighted).

IC No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
IC 101	4.2	0.7	0.7	4.2	7.8	0	4.2	7.8	–	–	–	–	–	–	–	–	
IC102	4.0	3.5	0	1.3	1.3	1.3	0	0	0.2	1.4	2.9	3.5	7.6	5.0	–	–	
IC103	7.1	.01	0	0	0	.01	0	6.9	0	0	0	0	0	13.8	–	–	
IC104	5.1	0	0	0	5.1	5.1	5.1	.1	.1	0	.1	.1.	0	.1	–	–	Manual
	4.9	0	0	0	5.1	5.1	5.1	1P	2P	0	2P	1P	0	2P	–	–	SCAN
IC105	.5	11.2	11.2	11.2	11.2	11.2	11.2	0	11.2	11.2	11.2	.1	.1	.1	.1	5.1	Manual
	9P	9P	9P	9P	9P	9P	9P	0	9P	9P	9P	1P	2P	1P	2P	5.1	SCAN



3-7 CRYSTAL LOCATION DIAGRAM

SECTION 4 PARTS LIST

4-1 MAIN BOARD 600-386

Item	Description	Part No.
	RESISTORS	
All Resistors are † 10%, ¼W, unless otherwise noted		
R101	1K	
R102	680 ohm	
R103	10K	
R104	10K	
R105	100 ohm	
R106	680 ohm	
R107	470 ohm	
R108	68 ohm	
R109	22K	
R110	10K	
R111	10K	
R112	10K	
R113	100 ohm	
R114	680 ohm	
R115	68 ohm	
R116	22K	
R117	10K	
R118	220 ohm	
R119	22K	
R120	10K	
R121	220 ohm	
R122	680 ohm	
R123	100 ohm	
R124	68 ohm	
R125	1.2K	
R126	1.2K	
R127	1.2K	
R128	1.2K	
R129	1.2K	
R130	1.2K	
R131	1.2K	
R132	1.2K	
R133	1.2K	
R134	1.2K	
R135	10K	
R136	39K	
R137	470 ohm	
R138	1K	
R139	82K	
R140	4.7K	
R141	39K	
R142	39K	
R143	82K	
R144	10K	
R145	1K	
R146	1K	
R147	1K, Trimmer	4751-0102-005
R148	820 ohm	
R149	1K	
R150	3.3K	
R151	150 ohm	

Item	Description	Part No.
R151	150 ohm	
R152	1K	
R153	3.3K	
R154	4.7K	
R155	47K	
R156	10K	
R157	4.7K	
R158	10K	
R159	4.7K	
R160	10K	
R161	4.7K	
R162	180 ohm	
R163	22K	
R164	180 ohm	
R165	12K	
R166	1.8K	
R167	1.5K	
R168	150 ohm	
R169	33 ohm	
R170	47K	
R171	270K	
R172	2.2K	
R173	4.7K	
R174	8.2K	
R175	39K	
R176	10K	
R177	5.6K	
R178	2.2K	
R179	100 ohm	
R180	10K	
R181	10K	
R182	10K	
R183	2.2K	
R184	27K	
R185	27K	
R186	47K	
R187	22K	
R188	47K	
R189	2.2 ohm	
R190	33 ohm	
R191	4.7K	
R192	82 ohm, 2W, 5%	4707-0820-031
R193	22K	
R194	47K	
R195	33K	
R196	4.7K	
R197	18K	
R198	220 ohm	
R199	470 ohm	
R200	2.2K	
R201	68 ohm, 2W, 5%	4707-0680-031

Item	Description	Part No.
	CAPACITORS	
C101	27pf 10%, 50V NPO (Disc.)	1500-0270-650
C102	82pf 5%, 50V NPO (Disc.)	1524-0820-002
C103	120pf 5%, 50V (Mica)	1506-0121-550
C104	82pf 5%, 50V NPO (Disc.)	1524-0820-002
C105	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C106	.001mf +80%-20% 500V, Z5U (Disc.)	1503-0102-001
C107	68pf 5%, 50V NPO (Disc.)	1524-0680-002
C108	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C109	5.6pf 10%, 500V NPO (Disc.)	1500-0569-905
C110	27pf 10%, 50V NPO (Disc.)	1500-0270-650
C111	2.7pf 10%, 500V NPO (Disc.)	1500-0279-905
C112	8.2pf 10%, 500V NPO (Disc.)	1500-0829-905
C113	.47pf 10% (Composition)	1510-0478-900
C114	5.6pf 10%, 500V NPO (Disc.)	1500-0569-905
C115	3.9pf 10%, 500V NPO (Disc.)	1500-0399-905
C116	.001mf +80%-20% 500V, Z5U (Disc.)	1503-0102-001
C117	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C118	5.6pf 10% 500V NPO (Disc.)	1500-0569-905
C119	.005mf +80%-20% 500V, Z5U (Disc.)	1502-0502-002
C120	1.0pf 10% (Composition)	1510-0010-900
C121	1.5-5.5pf, Trimmer	1517-0000-011
C122	1.5-5.5pf, Trimmer	1517-0000-011
C123	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C124	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C125	.47pf 10% (Composition)	1510-0478-900
C126	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C127	390pf 5% 50V (Mica)	1506-0391-550
C128	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C129	.005mf +80%-20% 500V, Z5U (Disc.)	1503-0502-002
C130	.01mf +80%-20% 500V, Z5U (Disc.)	1503-0103-001
C131	.001mf +80%-20% 500V, Z5U (Disc.)	1503-0102-001
C132	82pf 5% 50V NPO (Disc.)	1524-0820-002
C133	27pf 10% 50V NPO (Disc.)	1500-0270-650
C134	27pf 10% 50V NPO (Disc.)	1500-0270-650
C135	.001mf +80%-20% 500V, Z5U (Disc.)	1503-0102-001
C136	.001mf +80%-20% 500V, Z5U (Disc.)	1503-0102-001
C137	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C138	150pf 20% 50V, Z5F (Disc.)	1523-0151-002
C139	1.5-5.5pf Trimmer	1517-0000-011
C140	470pf 20% 50V, Z5F (Disc.)	1523-0471-002
C141	1mf 85° 16V (Electrolytic)	1513-0010-002
C142	3.9pf 10% (Composition)	1510-0399-900
C143	390pf 5% 50V (Mica)	1506-0391-550
C144	3.9pf 10% 500V NPO (Disc.)	1500-0399-905
C145	680pf 5% 50V (Mica)	1506-0681-550
C146	390pf 5% 50V (Mica)	1506-0391-550
C147	.01mf +80%-20% 25V (Disc.)	1502-0103-004
C148	.01mf +80%-20% 25V (Disc.)	1502-0103-004
C149	68pf 5% 50V NPO (Disc.)	1524-0680-002
C150	180pf 5% 50V (Mica)	1506-0181-550
C151	390pf 5% 50V (Mica)	1506-0391-550
C152	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C153	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C154	270pf 5% 50V (Mica)	1506-0271-550
C155	250pf 5% 50V (Mica)	1506-0251-550
C156	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C157	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C158	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C159	.002pf 20% 50V, Z5F (Disc.)	1523-0202-002
C160	39pf 10% 50V NPO (Disc.)	1500-0390-650
C161	.047mf 10% 100V (Mylar film)	1508-0473-610
C162	.1mf 20% 12V (Disc.)	1502-0104-005
C163	.1mf 20% 12V (Disc.)	1502-0104-005
C164	.01mf 10% 100V (Mylar film)	1508-0103-610
C165	470pf 20% 50V, Z5F (Disc.)	1523-0471-002
C166	.015mf 10% 100V (Mylar film)	1508-0153-610
C167	.047mf 10% 100V (Mylar Film)	1508-0473-610
C168	.002pf 20% 50V, Z5F (Disc.)	1523-0202-002
C169	1mf 85° C 16V (Electrolytic)	1513-0010-002
C170	1mf 85° C 16V (Electrolytic)	1513-0010-002
C171	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C172	.015mf 10% 100V (Mylar film)	1508-0153-610
C173	.0033mf 10% 100V (Mylar film)	1508-0332-610
C174	5mf 85° C 10V (Electrolytic)	1513-0050-001
C175	.05mf +80%-20% 25V (Disc.)	1502-0503-004
C176	.2mf +80%-20% 12V (Disc.)	1502-0204-006
C177	100mf 85° C 16V (Electrolytic)	1513-0101-002
C178	.047mf 10% 100V (Mular film)	1508-0473-610
C179	10mf 85° C 10V (Electrolytic)	1513-0100-001
C180	3.3mf 20% 85° C 10V (Electrolytic)	1513-0339-005
C181	.015mf 10% 100V (Mylar film)	1508-0153-610
C182	250mf 85° C 10V (Electrolytic)	1513-0251-001
C183	100mf 16V (Electrolytic)	1511-0102-002
	COILS	
L101	Choke .68 UHY	1802-0688-003
L102	Coil, RF input (Green)	1800-3152-005
L103	Coil, RF (Yellow)	1800-3152-004
L104	Coil, RF input (Red)	1800-3152-002
L105	Coil, RF input (Red)	1800-3152-002
L106	Coil, RF (Orange)	1800-3152-003
L107	Coil, RF 450 MHZ	1800-3160-001
L108	Coil, RF AMP out	1800-3160-002
L109	Choke 15 MHY	1802-0152-004
L110	Choke 15 MHY	1802-0152-004
L111	Choke 15 MHY	1802-0152-004
L112	Choke 15 MHY	1802-0152-004
L113	Choke 15 MHY	1802-0152-004
L114	Choke 15 MHY	1802-0152-004
L115	Choke 15 MHY	1802-0152-004
L116	Choke 15MHY	1802-0152-004
L117	Choke 15MHY	1802-0152-004
L118	Choke 15MHY	1802-0152-004
L119	Coil, RF Inj. (White)	1800-3152-009
L120	Coil, OSC.	1801-1236-900
L121	Coil OSC. 450 MHZ	1800-3160-003
L122	Coil RF (White)	1800-3191-401
L123	Coil RF (White)	1800-3191-401
L124	Coil RF (Yellow)	1800-3191-402
L125	Choke 6.8 uh 10%	1802-0689-003
L126	Choke	1802-0000-002

Item	Description	Part No.
	COILS (Cont'd.)	
L127	Choke	1802-0000-002
L128	Coil, Quadrature	1800-3151-700
	INTEGRATED CIRCUITS	
IC101	IC, 10.7 IF	3130-3167-901
IC102	IC, 455 KHZ Detector	3130-3157-603
IC103	IC, Audio Amplifier	3130-3157-614
IC104	IC, Counter	3130-3157-608
IC105	IC, Decoder Driver	3130-3193-501
	TRANSISTORS	
Q101	Silicon NPN (RT)	4801-0000-035
Q102	Silicon NPN (RT)	4801-0000-035
Q103	Silicon NPN (RT)	4801-0000-035
Q104	Silicon NPN (RT)	4801-0000-035
Q105	Junct. FET	4811-0000-015
Q106	Silicon NPN (RT)	4801-0000-035
Q107	Silicon NPN, MPS5172	4801-0000-100
Q108	Silicon NPN (RT)	4801-0000-035
Q109	Silicon PNP (WT)	4801-0000-060
Q110	Silicon NPN, MPS5172	4801-0000-010
Q111	Silicon NPN, MPS5172	4801-0000-010
Q112	Silicon NPN, MPS 5172	4801-0000-010
Q113	Silicon PNP (WT)	4801-0000-060
Q114	Silicon PNP (WT)	4801-0000-060
Q115	Silicon PNP (WT)	4801-0000-060
Q116	Silicon NPN, MPS 5172	4801-0000-060
Q117	Silicon NPN, MPS 5172	4801-0000-010
Q118	Silicon PNP (WT)	4801-0000-060
Q119	Silicon NPN, MPS 5172	4801-0000-010
Q120	Silicon PNP (WT)	4801-0000-060
Q121	Silicon NPN, MPS 5172	4801-0000-010
Q122	Silicon NPN, MPS 5172	4801-0000-010
Q123	PN Silicon, Unijunction	4813-0000-001
Q124	Silicon NPN, MPS 5172	4801-0000-010
	(WT) = White Top (RT) = Red Top	
	DIODES	
CR101	Germanium-junction, signal	4807-1233-900
CR102	Germanium-junction, signal	4807-1233-900
CR103	Germanium-junction, signal	4807-1233-900
CR104	Germanium-junction, signal	4807-1233-900
CR105	Germanium-junction, signal	4807-1233-900
CR106	Germanium-junction, signal	4807-1233-900
CR107	Germanium-junction, signal	4807-1233-900
CR108	Germanium-junction, signal	4807-1233-900
CR109	Germanium-junction, signal	4807-1233-900
CR110	Germanium-junction, signal	4807-1233-900
CR111	VARICAP	4809-0000-001
CR112	Silicon, IN4148	4805-1241-200
CR113	Silicon, IN4148	4805-1241-200
CR114	Zener 5% 5.1V	4808-0000-007
CR115	Silicon, IN4148	4805-1241-200
CR116	Silicon, IN4148	4805-1241-200
CR117	Silicon, IN4148	4805-1241-200

Item	Description	Part No.
CR118	Silicon, IN4148	4805-1241-200
CR119	Silicon, IN4148	4805-1241-200
CR120	Silicon, IN4148	4805-1241-200
CR121	Silicon, IN4148	4805-1241-200
CR122	Silicon, IN4148	4805-1241-200
CR123	Silicon, IN4148	4805-1241-200
CR124	Silicon, IN4148	4805-1241-200
CR125	Silicon, IN4148	4805-1241-200
CR126	Silicon, IN4148	4805-1241-200
CR127	Zener 8.2V	4808-0000-009
CR128	Silicon Rectifier	4806-0000-004
CR129	Silicon Rectifier	4806-0000-004
	FILTER	
CF101	Ceramic	2700-0000-007
	CRYSTAL	
Y111	10.245 MHZ	2301-3151-601
	MISCELLANEOUS	
SW101-	Switch (10POS)	5112-5038-401
SW110	Shield Assembly (301-602	2508-1256-300
		2508-1256-400

4-2 LIGHT BOARD 501-027

Item	Description	Part No.
	LAMPS	
M301-M310	Lamp, incandescent, 14.4V, 80MA (WB # 73)	3901-0000-007
	MECHANICAL	
	Bulb Cup	2830-1276-900
	Connector (12PIN)	2105-0000-012

4-3 CHASSIS ASSEMBLY

Item	Description	Part No.
	ELECTRICAL COMPONENTS	
R1	Res. Var. 10K/SW	4750-3212-101
R2	Res. Var. 7.5K	4750-3212-102
R3	Res. Comp. 1MEG., 10%, ½W	4701-0105-044
C1	.005MF, +80-20%, 1.4KV Z5U (Disc.)	1501-0502-002
SPK-1	Speaker 2 x 6 in. 8 ohm	1301-5101-000
ANT-1	Antenna, H/L Telescoping	1201-0000-002
ANT-2	Antenna, UHF Telescoping	1201-0000-003
T1	Power Transformer	5604-5100-600
J1, J2	Antenna Connector	2105-0000-005
P1	AC Connector	2105-1279-100
P2	DC Connector	2105-1277-900
Y100	Crystal, Receive (Low Band)	2303-0000-000
Y100	Crystal, Receive (Highband)	2302-0000-000
Y100	Crystal, Receive (450-470MHZ)	2304-0000-000
Y100	Crystal, Receive (470-500MHZ)	2320-0000-000
MA-16	AC Power Cord	6041-3215-900
MA-17	DC Power Cord Assembly	7011-1047-800
SW1-2	Switch	5112-6035-820
	MECHANICAL COMPONENTS	
	AC Shield	2508-3215-800
	Speaker, MTG. Speed Nut	2853-0000-003
TB-1	Terminal Board (3Lug)	2103-3007-907
	Front Panel (Bezel)	1405-6034-302
	Face Plate	2403-3212-600
	Knob, Volume & Squelch	2402-1276-202
	Lens, 10 Station	3900-5100-800
	Cabinet/Wrap Assembly	1408-6038-500
	Bushing, Mounting Bolt	2501-3214-000
	Bushing, UHF Antenna	2501-0000-006
	Bushing, H/L Antenna	2501-0000-007
	Feet, Rubber	1402-0000-001
	Mounting Bolt (¼-20 x 5/8	2806-0625-002
	Bracket, Mobile, Mounting	1400-3214-200
	Manual, Owner's Instruciton	7001-1047-500
	Manual, Service ($5.00 Prepaid)	

SECTION 5 SERVICE MANUAL ADDENDUM

ADDENDUM CONTENTS

5-1 Circuit Changes (Description)
5-2 Crystal Installation
5-3 Special Note on AFC Operation
5-4 Alignment and Tuning Procedure

- 5-4-1 Equipment Required
- 5-4-2 Quadrature Detector
- 5-4-3 IF Alignment
- 5-4-4 RF Alignment
- 5-4-5 AFC Alignment

5-5 DIAGRAMS, VOLTAGE DATA AND SCHEMATIC

- 5-5-1 Main Board Parts Placement Diagram
- 5-5-2 Main Board Bottom View
- 5-5-3 Main Board Jumper Diagram Bottom View
- 5-5-4 Voltage Data
- 5-5-5 Crystal Location Diagram
- 5-5-6 Schematic

5-6 PARTS LIST

- 5-6-1 Main Board 700-164

Contains Information on Main Printed Circuit Board 700-164.

5 - 1 CIRCUIT CHANGES (DESCRIPTION)

Changes made in the ACT-R 10 H/L/U started with serial #85-07500. Another 1st oscillator has been added to the unit. Now there is a separate oscillator for the High and Low Band crystals and one for the UHF crystals. The first L.O. (local oscillator, Q125, uses third overtone crystals and operates on all VHF channels, whether High or Low Band. For Low Band signals, the fundamental frequency of the crystal is taken off the Emitter of Q125 for injection. For High VHF Band signals, the third harmonic of the crystal is coupled off the collector of Q125 for oscillator injection. For UHF Band signals, the third harmonic of the crystal is coupled off the collector circuitry of Q107 (the first L.O. for UHF) and is coupled to the base of Q108. Q108 is a tripler which multiplies the 3rd harmonic of the UHF oscillator (Q107) by three for use as the ultimate injection frequency. Instead of two rows of crystal pins, there are now three rows of crystal socket pins. The middle or center row is common to the diode switching circuitry (CR-101-110, R125-134, L109-118), thus one pin or lead of the crystal is always inserted in the center row. The other crystal lead is inserted in the associated socket in one of the two outer rows, depending upon whether it is a VHF or UHF crystal. This connects the crystal to its appropriate oscillator.

5 - 2 CRYSTAL INSTALLATION

Due to the numerous frequencies involved, the crystal is not normally installed by the factory, but by the seller or owner of the unit. Miniature, plug-in crystals are installed by inserting them in receptacles mounted on the printed circuit board.

Prior to installing a crystal, the receiver's cover will have to be removed. To remove the cover, first remove telescopic antennas if they are installed. Second, unscrew the two large bolts located at the sides of the unit. The cover may then be slipped off by sliding it toward the rear of the unit.

Carefully install the crystal in the proper pair of socket pins as indicated in the Crystal Location Drawing 5-5-5. The crystal MUST be installed in the proper row for correct operation. The numbers located between two of the rows of pins indicate which group of pins correspond to the channel number on the front panel.

If the crystal is for the UHF band (450 to 500 MHz), it should be installed with one lead in a center row pin (labeled COMMON) and its other lead in the corresponding pin in the row labeled UHF (row of pins near the rear of unit). If the crystal is for one of the VHF bands (either High or Low), it should be installed with one lead in a center row pin and its other lead in the corresponding pin in the row labeled VHF (row of pins near the fron of unit). Thus, one of the crystal's leads must always be inserted in a center row socket pin while its other lead is inserted in the proper corresponding outer row socket pin.

Band programming and crystal specifications are the same as stated in the original ACT-R 10 Service and Instruction Manual.

5 - 3 SPECIAL NOTE ON AFC OPERATION

The second L.O. frequency is normally 10.245 MHz. In cases where interference is encountered from a signal approximately 910 KHz below the desired frequency, the second L.O. may be changed to 11.155 MHz. If the second L.O. is 10.245 MHz, the error voltage is taken from the collector of Q111. If the second L.O. has been changed to 11.155 MHz, the error voltage is taken from the collector of Q110. Also, if the 450 MHz RF crystals are changed to high side injection and the IF crystal is still 10.245 MHz, the error voltage is taken from the collector of Q110.

5 - 4 ALIGNMENT AND TUNING PROCEDURE

5 - 4-1 EQUIPMENT REQUIRED

5-4-1-1 FM Signal Generator
5-4-1-2 Oscilloscope
5-4-1-3 AC VTVM

NOTE: During all steps of alignment, the squelch control should be in the maximum clockwise position (minimum squelch action).

All receiver RF sections (Low, High and UHF) should be aligned to the channel nearest the center of the frequency range in the band over which they will operate.

5 - 4-2 QUADRATURE DETECTOR

5-4-2-1 Connect the FM Signal Generator to the H/L antenna input jack. Accurately set the frequency to the center of the channel being used for alignment. Modulate Signal Generator with 1000 Hz, 3 KHz deviation.

5-4-2-2 Connect the oscilloscope to Junction of C162, C163 and R172.

5-4-2-3 Adjust Signal Generator's output until all of the noise in the scope pattern just disappears.

5-4-2-4 Adjust L128 for maximum peak to peak amplitude, while maintaining symmetry of the detected signal. When L128 is properly aligned, signal at above Junction should be approximately 0.2 volts RMS with test signal input as noted in 5-4-2-1.

5 - 4-3 IF ALIGNMENT

5-4-3-1 Pre-Set the cores of L122, L123 and L124 9 turns in from the outer end of the coil form. This step is usually necessary only if the IF appears to be badly misaligned.

5-4-3-2 Connect AC voltmeter to the Junction of R 167 and the collector of Q116.

5-4-3-3 Set AC voltmeter to the 300 millivolts scale.

5-4-3-4 With generator accurately set to the frequency of the center of the channel being used for alignment, increase Signal Generator's output until AC voltmeter reading is mid-range.

5-4-3-5 Adjust L122, L123, and L124 (in that order) for maximum AC voltmeter reading. Readjust Signal Generator's output to maintain voltmeter reading approximately in the mid-range. Repeat adjustment until no further improvements can be made.

5-4-4 RF ALIGNMENT

LOW BAND SECTION

5-4-4-1 Pre-Set the cores of L102 and L103 one turn from the outer ends of the coil form. (NOTE: Due to the broadness of the Low Band Section, presetting the above cores will give you optimum performance over the entire band).

HIGH BAND SECTION

5-4-4-2 Connect AC voltmeter to the Junction of R 167 and the collector of Q116.

5-4-4-3 Set AC voltmeter to the 300 millivolts scale.

5-4-4-4 Activate High Band channel nearest to center of High Band frequencies being used.

5-4-4-5 With the Signal Generator accurately set to the frequency of the channel being used for alignment and connected to H/L antenna input jack, increase Signal Generator's output until AC voltmeter reading is mid-range.

5-4-4-6 Adjust L109, L104, L105 and L106 (in that order) for maximum AC voltmeter reading. Readjust Signal Generator's output to maintain voltmeter reading approximately in the mid-range. Repeat adjustment until no further improvements can be made.

UHF BAND SECTION

5-4-4-7 Connect AC voltmeter across the speaker terminals.

5-4-4-8 With Signal Generator output reduced to zero, adjust the volume control until AC voltmeter reads 1.0 volt of noise.

5-4-4-9 Activate UHF channel nearest to center of UHF frequencies being used.

5-4-4-10 Set Signal Generator accurately to the channel being used and adjust output of Signal Generator until AC voltmeter reads .2 volts.

5-4-4-11 Pre-Set trimmer capacitor C139 for minimum capacitance. The movable half-moon section (gold color) should be turned toward the right side of the unit, as viewed from the front.

5-4-4-12 Adjust trimmer capacitor C121 and C122 (in that order) for maximum quieting (lowest meter reading). Adjust Signal Generator output to maintain a voltmeter reading between 0.1 and 0.2 volts. Repeat adjustments until no further improvement can be made.

NOTE: Use a non-metallic tool for all trimmer capacitor adjustments. Peaks are very sharp, so tune with care.

5-4-4-13 Adjust the core of L119 for maximum quieting (lowest meter reading). Adjust Signal Generator's output to maintain a reading between 0.1 and 0.2 volts.

5-4-4-14 Adjust trimmer capacitor C139 for maximum quieting (lowest meter reading). Adjust Signal Generator's output to maintain a reading between 0.1 and 0.2 volts.

5-4-4-15 Readjust trimmer capacitors C121, C122 and C139 (in that order) for maximum quieting (lowest meter reading). Adjust Signal Generator's output to maintain a voltmeter reading between 0.1 and 0.2 volts. Repeat these adjustments until no further improvement can be made.

5-4-5 AFC ALIGNMENT

NOTE: This adjustment requires an accurate 10.7 MHz ±1 KHz oscillator or 455 KHz ±500 Hz oscillator to be used as a reference signal. If none are available, proceed to Step 5-4-5-4.

5-4-5-1 With a coupling loop, inject "Reference" Signal (either 10.7 MHz or 455 KHz) to produce good quieting (more than 30 DB quieting). Adjust R147 for reading of 3.8 to 4.0 volts at the collector of Q109.

5-4-5-2 Remove the "Reference" Signal and have the unit squelched and receiving no signal. The voltage on the collector of Q109 shall be between 3.2 and 4.6 volts. If not, note voltage and proceed to Step 5-4-5-3. If voltage is between 3.2 and 4.6 volts, AFC alignment is complete.

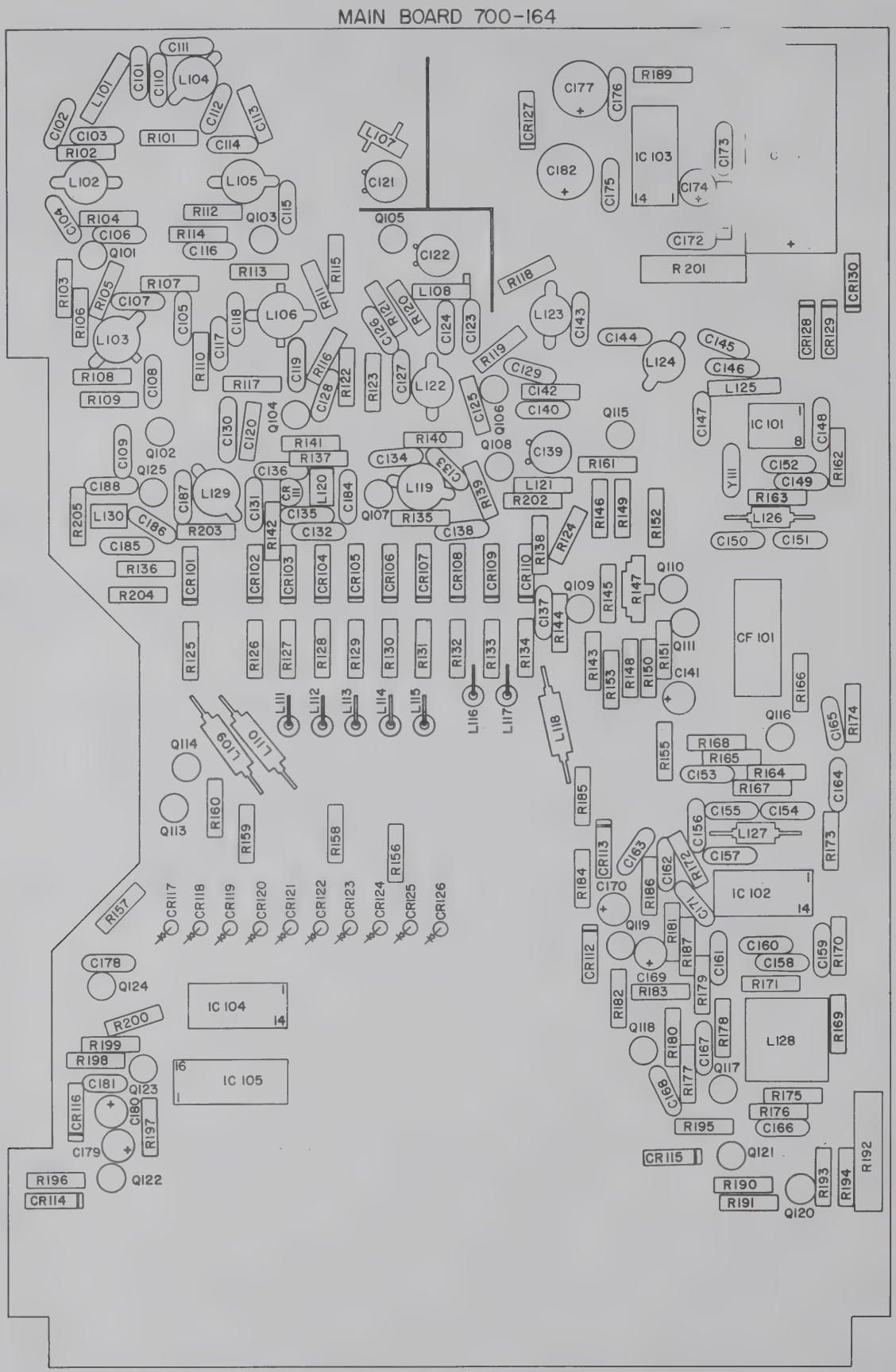
NOTE: Any further adjustments made to L128 and R147 will require AFC to be re-adjusted.

5-4-5-3 Inject "Reference" Signal and monitor voltage on collector of Q109. Adjust L128 for same voltage as noted in step 5-4-5-2. Readjust R147 for a voltmeter reading of 3.8 to 4.0 volts. Repeat step 5-4-5-2.

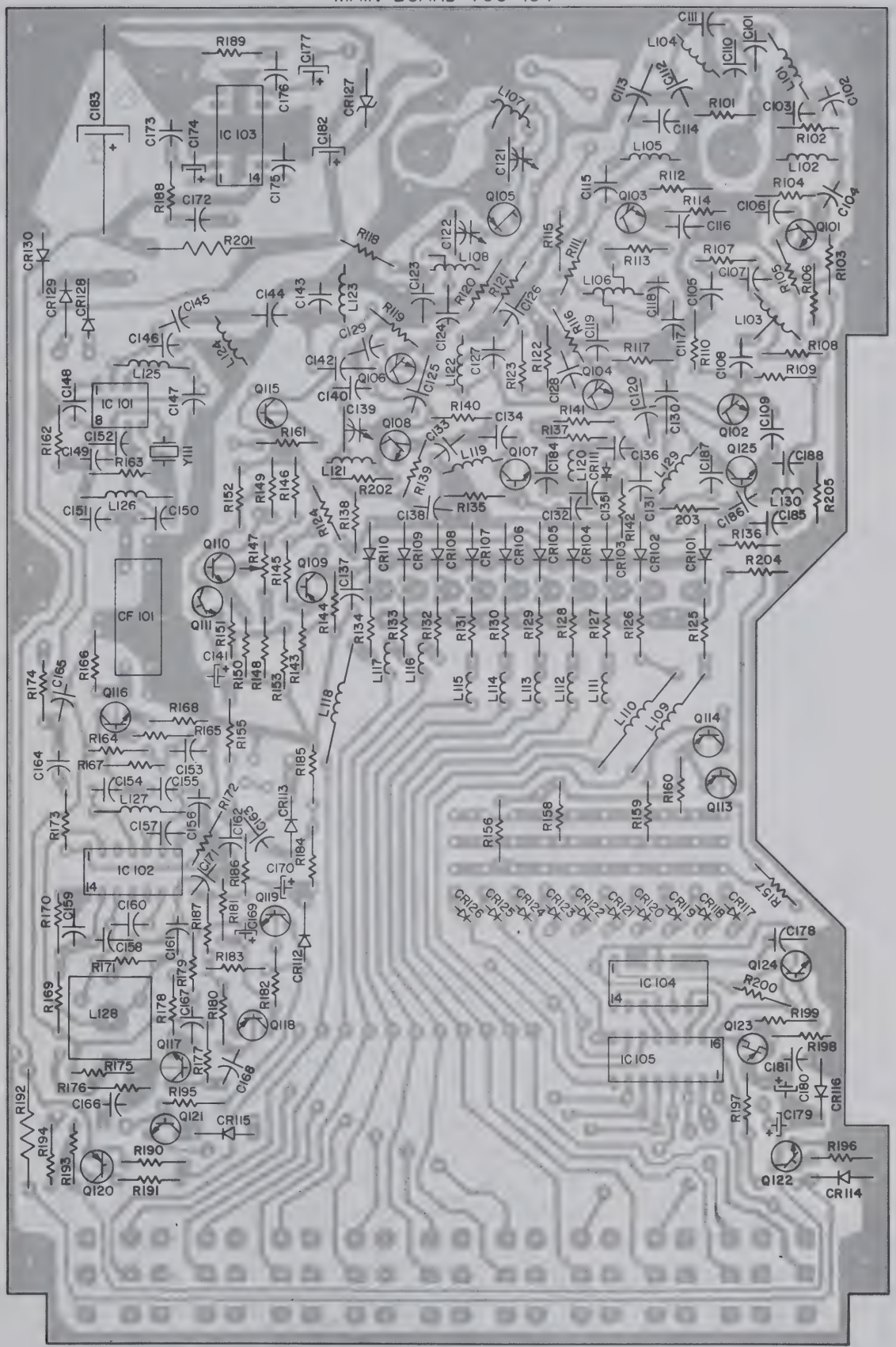
NOTE: Do Not adjust L128 more than 1/4 turn at a time.

5-4-5-4 If an accurate I.F. signal source is not available, an appropriate AFC alignment can be made by adjusting L128 on a High Band or Low Band crystal as specified in Quadrature Detector Alignment (Section 5-4-2, and with the unit squelched and receiving no signal, adjust R147 for voltmeter reading of 3.2 to 4.6 on the collector of Q109.

NOTE: Units equipped with a 10.245 MHz crystal have the jumper in the AFC circuit connected between the base of Q109 and collector of Q111. When a 11.155 MHz crystal is used, the jumper is connected between the base of Q109 and the collector of Q110. If the crystal is changed from one frequency to the other, the jumper must be also changed. If the UHF first L.O. crystals are made for high side injection (to eliminate a primary image problem in certain areas of the country), the jumper must be changed.

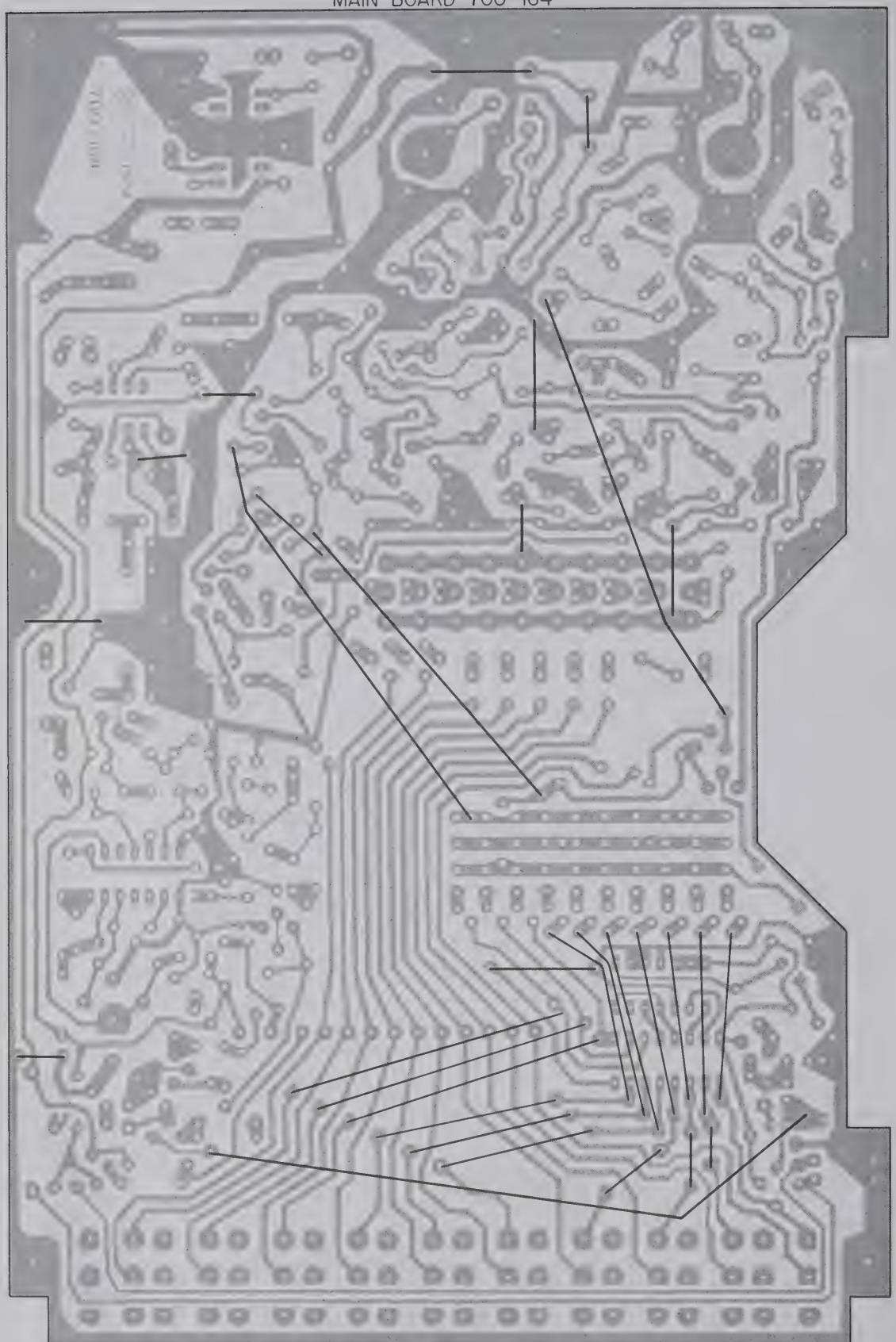


5 - 5-1 MAIN BOARD PLACEMENT DIAGRAM 700 - 164



5 - 5-2 MAIN BOARD BOTTOM VIEW 700 - 164

MAIN BOARD 700-164



JUMPERS ARE LOCATED TOP SIDE. DIAGRAM SHOWS COPPER SIDE FOR PROPER CONNECTIONS.

5 - 5-3 MAIN BOARD JUMPER DIAGRAM BOTTOM VIEW

5 - 5-4 VOLTAGE DATA

NOTE: All voltages are nominal and are measured with a VTVM. SCAN indicates the unit is scanning. MAN indicates the unit is not scanning and is stopped at channel 1. A "P" beside a voltage indicates that the meter reading is pulsating (fluctuating) because the scanner section of the unit is operating.

VOLTAGE DATA – SEMICONDUCTORS

TRANSISTOR	EMITTER (Source)	BASE (Gate)	COLLECTOR (Drain)	
Q101	3.1	3.8	7.0	Low Band Activated
	0	0	0	High Band Activated
	0	0	0	UHF Band Activated
Q102	1.6	2.3	7.7	Low Band Activated
	1.6	0	7.7	High Band Activated
	1.4	0	7.7	UHF Band Activated
Q103	0	0	8.2	Low Band Activated
	3.1	3.8	7.9	High Band Activated
	0	0	8.2	UHF Band Activated
Q104	1.6	0	7.7	Low Band Activated
	1.6	2.3	7.7	High Band Activated
	1.4	0	7.7	UHF Band Activated
Q105 (FET)	0	0	6.0	
Q106	1.6	0	7.7	Low Band Activated
	1.6	0	7.7	High Band Activated
	1.6	2.3	7.7	UHF Band Activated
Q107	3.7	4.4	7.3	No Crystal
	3.4	4.0	7.3	With Crystal
Q108	0	.4	7.3	UHF Band (No Crystal)
	0	.1	4.0	UHF Band (With Crystal)
Q109 (PNP)	7.9	7.2	3-5	
Q110	2.9	3.6	7.2	
Q111	2.9	3.6	7.4	
Q113 (PNP)	8.2	7.5	8.1	Low Band Activated
	8.2	8.2	0	High Band Activated
	8.2	8.2	0	UHF Band Activated
Q114 (PNP)	8.2	8.2	0	Low Band Activated
	8.2	7.5	8.1	High Band Activated
	8.2	8.2	0	UHF Band Activated
Q115 (PNP)	8.2	8.2	0	Low Band Activated
	8.2	8.2	0	High Band Activated
	8.2	7.5	8.1	UHF Band Activated
Q116	0.4	1.1	4.5	

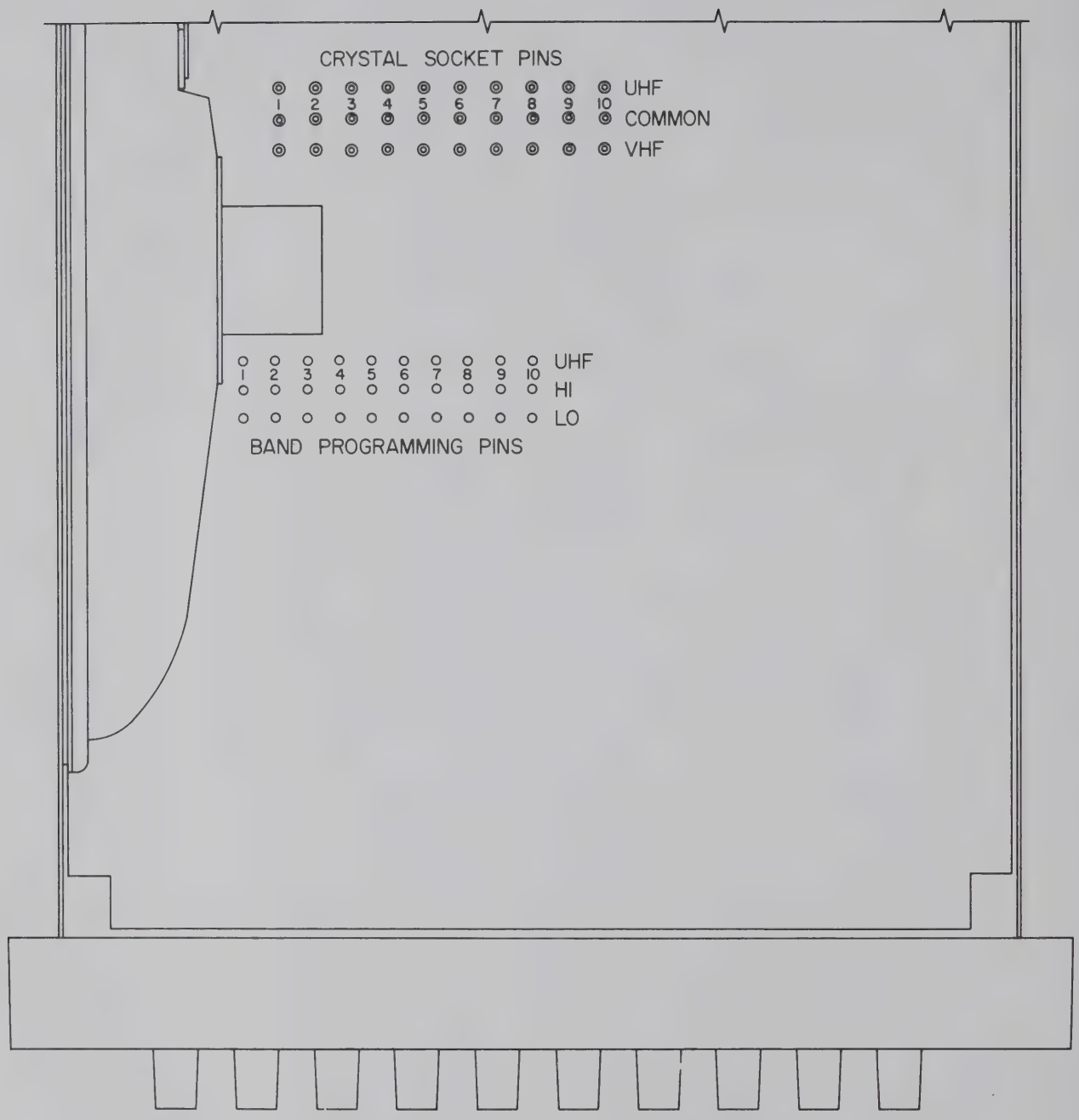
TRANSISTOR	EMITTER (Source)	BASE (Gate)	COLLECTOR (Drain)	
Q117	1.0	1.7	5.0	
Q118	8.2	8.2	0	(Unsquelched)
	8.2	8.2	1.0	(Squelched)
	8.2	8.2	1.5	Min. (Tight Squelched)
Q119	0	0	7.2	(Unsquelched)
	0	0.8	0.2	(Squelched)
	0	0.8	0.1	(Tight Squelched)
Q120	13.8	13.1	13.6	(SCAN)
	13.8	13.1	13.6	(MAN)
	13.8	13.8	0	(No Lights)
Q121	0	0	4.0	(SCAN)
	0	0.8	0.1	(MAN)
Q122	0	0.8	0.1	
Q124	0	.2	4.9	(SCAN)
	0	.2	5.1	(MAN)
Q125	3.7	4.4	7.3	No Crystal
	3.4	4.0	7.3	With Crystal
	BASE 1	**EMITTER**	**BASE 2**	
Q123	0.2	3.8	5.1	(SCAN)
Unijunction	o.2	0.5	5.1	(MAN)
	CATHODE	**ANODE**		
CR113	1.8	2.4		(Unsquelched)
	1.0	0		(Squelched)

VOLTAGE DATA

INTEGRATED CIRCUITS

NOTE: A "P" beside a voltage indicates that the meter reading is pulsating (fluctuating) because the scanner section of the unit is operating. MAN indicates the unit is not scanning and is at channel 1 (M301 is lighted).

IC No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
IC101	4.2	0.7	0.7	4.2	7.8	0	4.2	7.8	–	–	–	–	–	–	–	–	
IC102	4.0	3.5	0	1.3	1.3	1.3	0	0	0.2	1.4	2.9	3.5	7.6	5.0	–	–	
IC103	7.1	.01	0	0	0	.01	0	6.9	0	0	0	0	0	13.8	–	–	
IC104	5.1	0	0	0	5.1	5.1	5.1	.1	.1	0	.1	.1	0	.1	–	–	Manual
	4.9	0	0	0	5.1	5.1	5.1	1P	2P	0	2P	1P	0	2P	–	–	SCAN
IC105	.5	11.2	11.2	11.2	11.2	11.2	11.2	0	11.2	11.2	11.2	.1	.1	.1	.1	5.1	Manual
	9P	9P	9P	9P	9P	9P	9P	0	9P	9P	9P	1P	2P	1P	2P	5.1	SCAN



5 - 5-5 CRYSTAL LOCATION DIAGRAM

5-6 PARTS LIST

5 - 6-1 MAIN BOARD 700 - 164

Item	Description	Part No.
	RESISTORS	
R101	1K, 10%, ¼W	4701-0102-042
R102	680 ohm, 10%, ¼W	4701-0681-042
R103	10K, 10%, ¼W	4701-0103-042
R104	10K, 10%, ¼W	4701-0103-042
R105	100 ohm, 10%, ¼W	4701-0101-042
R106	680 ohm, 10%, ¼W	4701-0681-042
R107	470 ohm, 10%, ¼W	4701-0471-042
R108	68 ohm, 10%, ¼W	4701-0680-042
R109	22K, 10%, ¼W	4701-0223-042
R110	10K, 10%, ¼W	4701-0103-042
R111	10K, 10%, ¼W	4701-0103-042
R112	10K, 10%, ¼W	4701-0103-042
R113	100 ohm, 10%, ¼W	4701-0101-042
R114	680 ohm, 10%, ¼W	4701-0681-042
R115	68 ohm, 10%, ¼W	4701-0680-042
R116	22K, 10%, ¼W	4701-0223-042
R117	10K, 10%, ¼W	4701-0103-042
R118	220 ohm, 10%, ¼W	4701-0221-042
R119	22K, 10%, ¼W	4701-0223-042
R120	10K, 10%, ¼W	4701-0103-042
R121	220 ohm, 10%, ¼W	4701-0221-042
R122	680 ohm, 10%, ¼W	4701-0681-042
R123	100 ohm, 10%, ¼W	4701-0101-042
R124	33 ohm, 10%, ¼W	4701-0330-042
R125	1.2K, 10%, ¼W	4701-0122-042
R126	1.2 K, 10%, ¼W	4701-0122-042
R127	1.2K, 10%, ¼W	4701-0122-042
R128	1.2K, 10%, ¼W	4701-0122-042
R129	1.2K, 10%, ¼W	4701-0122-042
R130	1.2K, 10%, ¼W	4701-0122-042
R131	1.2K, 10%, ¼W	4701-0122-042
R132	1.2K, 10%, ¼W	4701-0122-042
R133	1.2K, 10%, ¼W	4701-0122-042
R134	1.2K, 10%, ¼W	4701-0122-042
R135	10K, 10%, ¼W	4701-0103-042
R136	39K, 10%, ¼W	4701-0393-042
R137	470 ohm, 10%, ¼W	4701-0471-042
R138	1K, 10%, ¼W	4701-0102-042
R139	82K, 10%, ¼W	4701-0823-042
R140	4.7K, 10%, ¼W	4701-0472-042
R141	39K, 10%, ¼W	4701-0393-042
R142	39K, 10%, ¼W	4701-0393-042
R143	82K, 10%, ¼W	4701-0823-042
R144	10K, 10%, ¼W	4701-0103-042
R145	1K, 10%, ¼W	4701-0102-042
R146	1K, 10%, ¼W	4701-0102-042
R147	1K, Trimmer (Vert.)	4751-0102-005
R148	820 ohm, 10%, ¼W	4701-0821-042
R149	1K, 10%, ¼W	4701-0102-042
R150	3.3K, 10%, ¼W	4701-0332-042
R151	150 ohm, 10%, ¼W	4701-0151-042
R152	1K, 10%, ¼W	4701-0102-042
R153	3.3K, 10%, ¼W	4701-0332-042
R155	47K, 10%, ¼W	4701-0473-042
R156	10K, 10%, ¼W	4701-0103-042
R157	4.7K, 10%, ¼W	4701-0472-042
R158	10K, 10%, ¼W	4701-0103-042
R159	4.7K, 10%, ¼W	4701-0472-042
R160	10K, 10%, ¼W	4701-0103-042
R161	4.7K, 10%, ¼W	4701-0472-042
R162	180 ohm, 1C%, ¼W	4701-0181-042
R163	22K, 10%, ¼W	4701-0223-042
R164	180 ohm, 10%, ¼W	4701-0181-042
R165	12K, 10%, ¼W	4701-0123-042
R166	1.8K, 10%, ¼W	4701-0182-042
R167	1.5K, 10%, ¼W	4701-0152-042
R168	150 ohm, 10%, ¼W	4701-0151-042

Item	Description	Part No.
R169	33 ohm, 10%, ¼W	4701-0330-042
R170	47K, 10%, ¼W	4701-0473-042
R171	270K, 10%, ¼W	4701-0274-042
R172	2.2K, 10%, ¼W	4701-0222-042
R173	4.7K, 10%, ¼W	4701-0472-042
R174	8.2K, 10%, ¼W	4701-0822-042
R175	39K, 10%, ¼W	4701-0393-042
R176	10K, 10%, ¼W	4701-0103-042
R177	5.6K, 10%, ¼W	4701-0562-042
R178	2.2K, 10%, ¼W	4701-0222-042
R179	100 ohm, 10%, ¼W	4701-0101-042
R180	10K, 10%, ¼W	4701-0103-042
R181	10K, 10%, ¼W	4701-0103-042
R182	10K, 10%, ¼W	4701-0103-042
R183	2.2K, 10%, ¼W	4701-0222-042
R184	27K, 10%, ¼W	4701-0273-042
R185	27K, 10%, ¼W	4701-0273-042
R186	47K, 10%, ¼W	4701-0473-042
R187	22K, 10%, ¼W	4701-0223-042
R188	47K, 10%, ¼W	4701-0473-042
R189	2.2 ohm, 10%, ¼W	4701-0229-042
R190	33 ohm, 10%, ¼W	4701-0330-042
R191	4.7K, 10%, ¼W	4701-0472-042
R192	82 ohm, 5%, 2W	4710-0820-031
R193	22K, 10%, ¼W	4701-0223-042
R194	47K, 10%, ¼W	4701-0473-042
R195	33K, 10%, ¼W	4701-0333-042
R196	18K, 10%, ¼W	4701-0183-042
R197	18K, 10%, ¼W	4701-0183-042
R198	220 ohm, 10%, ¼W	4701-0221-042
R199	470 ohm, 10%, ¼W	4701-0471-042
R200	2.2K, 10%, ¼W	4701-0222-042
R201	68 ohm, 5%, 2W	4710-0680-031
R202	4.7K, 10%, ¼W	4701-0472-042
R203	10K, 10%, ¼W	4701-0103-042
R204	39K, 10%, ¼W	4701-0393-042
R205	470 ohm, 10%, ¼W	4701-0471-042
	CAPACITORS	
C101	27Pf, 10%, NPO, 50v (Disc)	1500-0270-650
C102	82Pf, 5%, NPO, 50v (Disc)	1524-0820-002
C103	120Pf, 5%, 50v (Mica)	1506-0121-550
C104	82Pf, 5%, NPO, 50v (Disc)	1524-0820-002
C105	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C106	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C107	68Pf, 5%, NPO, 50v (Disc)	1524-0680-002
C108	.005. mfd, +80 -20%, 500v (Disc)	1503-0502-002
C109	5.6Pf, 10%, NPO, 500v (Disc)	1500-0569-905
C110	27Pf, 10%, NPO, 50v (Disc)	1500-0270-650
C111	2.7Pf, +/-.25Pf, NPO, 500v (Disc)	1500-0279-205
C112	8.2Pf, 10%, NPO, 500v (Disc)	1500-0829-905
C113	.47Pf, 10%, (Composition)	1510-0478-900
C114	5.6Pf, 10%, NPO, 500v (Disc)	1500-0569-905
C115	3.9Pf, 10%, NPO, 500v (Disc)	1500-0399-905
C116	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C117	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C118	5.6Pf, 10%, NPO, 500v (Disc)	1500-0569-905
C119	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C120	1Pf, 10%, (Composition)	1510-0010-900
C121	1.5 - 5.5Pf, Trimmer	1517-0000-011
C122	1.5 - 5.5Pf, Trimmer	1517-0000-011
C123	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C124	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C125	.47Pf, 10%, (Composition)	1510-0478-900
C126	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C127	390Pf, 5%, 50v (Mica)	1506-0391-550

Item	Description	Part No.
C128	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C129	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C130	.01 mfd, +80 -20%, 500v (Disc)	1502-0103-001
C131	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C132	82Pf, 5%, NPO, 50v (Disc)	1524-0820-002
C133	27Pf, 10%, NPO, 50v (Disc)	1500-0270-650
C134	27Pf, 10%, NPO, 50v (Disc)	1500-0270-650
C135	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C136	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C137	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C138	150Pf, 20%, 50v (Disc)	1523-0151-002
C139	1.5 - 5.5Pf, Trimmer	1517-0000-011
C140	470Pf, 20%, 50v (Disc)	1523-0471-002
C141	1 mfd, 16v 85°C (Electrolytic)	1513-0010-002
C142	3.9Pf, 10% (Composition)	1510-0399-900
C143	390Pf, 5%, 50v (Mica)	1506-0391-550
C144	3.9Pf, 10%, NPO, 500v (Disc)	1500-0399-905
C145	680Pf, 5%, 50v (Mica)	1506-0681-550
C146	390Pf, 5%, 50v (Mica)	1506-0391-550
C147	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C148	.01 mfd, +80 -20%, 25v (Disc)	1502-0103-004
C149	68Pf, 5%, NPO, 50v (Disc)	1524-0680-002
C150	180Pf, 5%, 50v (Mica)	1506-0181-550
C151	390Pf, 5%, 50v (Mica)	1506-0391-550
C152	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C153	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C154	270Pf, 5%, 50v (Mica)	1506-0271-550
C155	250Pf, 5%, 50v (Mica)	1506-0251-550
C156	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C157	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C158	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C159	.002 mfd, 20%, 50v (Disc)	1523-0202-002
C160	39Pf, 10%, NPO, 50v (Disc)	1500-0390-650
C161	.047 mfd, 10%, 100v (Mylar film)	1508-0473-610
C162	.1 mfd, 20%, 12v (Disc)	1502-0104-005
C163	.1 mfd, 20%, 12v (Disc)	1502-0104-005
C164	.01 mfd, 10%, 100v (Mylar film)	1508-0103-610
C165	470Pf, 20%, 50v (Disc)	1523-0471-002
C166	.015 mfd, 10%, 100v (Mylar film)	1508-0153-610
C167	.047 mfd, 10%, 100v (Mylar film)	1508-0473-610
C168	.002 mfd, 20%, 50v (Disc)	1523-0202-002
C169	1 mfd, 16v, 85°C (Electrolytic)	1513-0010-002
C170	1 mfd, 16v, 85°C (Electrolytic)	1513-0010-002
C171	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C172	.015 mfd, 10%, 100v (Mylar film)	1508-0153-610
C173	.0033 mfd, 10%, 100v (Mylar film)	1508-0332-610
C174	5 mfd, 10v, 85°C (Electrolytic)	1513-0050-001
C175	.05 mfd, +80 -20%, 25v (Disc)	1502-0503-004
C176	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C177	100 mfd, 16v, 85°C (Electrolytic)	1513-0101-002
C178	.047 mfd, 10%, 100v (Mylar film)	1508-0473-610
C179	10 mfd, 10v, 85°C (Electrolytic)	1513-0100-001
C180	3.3 mfd, 20%, 10v, 85°C (Electrolyt.)	1513-0339-005
C181	.015 mfd, 10%, 100v (Mylar film)	1508-0153-610
C182	250 mfd, 10v, 85°C (Electrolytic)	1513-0251-001
C183	1000 mfd, 16v, 85°C (Electrolytic)	1513-0102-002
C184	3.9Pf, 10%, NPO, 500v (Disc)	1500-0399-905
C185	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C186	82Pf, 5%, NPO, 50v (Disc)	1524-0820-002
C187	15Pf, 10%, NPO, 50v (Disc)	1500,0150-650
C188	47pf, 5%, NPO, 50V (Disc.)	1524-0470-002
C189	0.2 mfd, +80 -20%, 12V (Disc.)	1502-0204-006

COILS

L101	Choke, .68 mhy	1802-0688-003
L102	Input, RF AMP (Green)	1800-3152-005
L103	Output, RF AMP (Yellow)	1800-3152-004
L104	Input, RF AMP (Red)	1800-3152-002
L105	Input, RF AMP (Red)	1800-3152-002
L106	Output, RF AMP (Orange)	1800-3152-003
L107	Input, RF AMP (UHF)	1800-3160-001
L108	Output, RF AMP (UHF)	1800-3160-002
L109	Choke, 15 mhy	1802-0152-004
L110	Choke, 15 mhy	1802-0152-004
L111	Choke, 15 mhy	1802-0152-004
L112	Choke, 15 mhy	1802-0152-004
L113	Choke, 15 mhy	1802-0152-004
L114	Choke, 15 mhy	1802-0152-004
L115	Choke, 15 mhy	1802-0152-004
L116	Choke, 15 mhy	1802-0152-004
L117	Choke, 15 mhy	1802-0152-004
L118	Choke, 15 mhy	1802-0152-004
L119	Oscillator, collector (White)	1800-3152-009
L120	Oscillator, emitter	1801-1236-900
L121	Tripler, collector	1800-3160-003
L122	10.7 MHz IF (White)	1800-3191-401
L123	10.7 MHz IF (White)	1800-3191-401
L124	10.7 MHz IF (Yellow)	1800-3191-402
L125	Choke, 6.8 mhy, 10%	1802-0689-003
L126	Choke, 820 mhy	1802-0000-002
L127	Choke, 820 mhy	1802-0000-002
L128	Quadrature Detector	1800-3151-700
L129	Oscillator, collector (White)	1800-3152-009

DIODES

CR101	Germanium - junction, signal	4807-1233-900
CR102	Germanium - junction, signal	4807-1233-900
CR103	Germanium - junction, signal	4807-1233-900
CR104	Germanium - junction, signal	4807-1233-900
CR105	Germanium - junction, signal	4807-1233-900
CR106	Germanium - junction, signal	4807-1233-900
CR107	Germanium - junction, signal	4807-1233-900
CR108	Germanium - junction, signal	4807-1233-900
CR109	Germanium - junction, signal	4807-1233-900
CR110	Germanium - junction, signal	4807-1233-900
CR111	Varactor, SMV 1172	4809-0000-001
CR112	Silicon, signal	4805-1241-200
CR113	Silicon, signal	4805-1241-200
CR114	Zener, 5.1v, 5%, 1W	4808-0000-007
CR115	Silicon, signal	4805-1241-200
CR116	Silicon, signal	4805-1241-200
CR117	Silicon, signal	4805-1241-200
CR118	Silicon, signal	4805-1241-200
CR119	Silicon, signal	4805-1241-200
CR120	Silicon, signal	4805-1241-200
CR121	Silicon, signal	4805-1241-200
CR122	Silicon, signal	4805-1241-200
CR123	Silicon, signal	4805-1241-200
CR124	Silicon, signal	4805-1241-200
CR125	Silicon, signal	4805-1241-200
CR126	Silicon, signal	4805-1241-200
CR127	Zener, 8.2v, 5%, 1W	4808-0000-009
CR128	Silicon, Rectifier	4806-0000-004
CR129	Silicon, Rectifier	4806-0000-004
CR130	Silicon, Rectifier	4806-0000-004

TRANSISTORS

Q101	Silicon, NPN (Red top)	4801-0000-035
Q102	Silicon, NPN (Red top)	4801-0000-035
Q103	Silicon, NPN (Red top)	4801-0000-035
Q104	Silicon, NPN (Red top)	4801-0000-035
Q105	Field Effect, junction	4811-0000-015

Item	Description	Part No.
C128	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C129	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C130	.01 mfd, +80 -20%, 500v (Disc)	1502-0103-001
C131	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C132	82Pf, 5%, NPO, 50v (Disc)	1524-0820-002
C133	27Pf, 10%, NPO, 50v (Disc)	1500-0270-650
C134	27Pf, 10%, NPO, 50v (Disc)	1500-0270-650
C135	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C136	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C137	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C138	150Pf, 20%, 50v (Disc)	1523-0151-002
C139	1.5 - 5.5Pf, Trimmer	1517-0000-011
C140	470Pf, 20%, 50v (Disc)	1523-0471-002
C141	1 mfd, 16v 85°C (Electrolytic)	1513-0010-002
C142	3.9Pf, 10% (Composition)	1510-0399-900
C143	390Pf, 5%, 50v (Mica)	1506-0391-550
C144	3.9Pf, 10%, NPO, 500v (Disc)	1500-0399-905
C145	680Pf, 5%, 50v (Mica)	1506-0681-550
C146	390Pf, 5%, 50v (Mica)	1506-0391-550
C147	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C148	.01 mfd, +80 -20%, 25v (Disc)	1502-0103-004
C149	68Pf, 5%, NPO, 50v (Disc)	1524-0680-002
C150	180Pf, 5%, 50v (Mica)	1506-0181-550
C151	390Pf, 5%, 50v (Mica)	1506-0391-550
C152	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C153	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C154	270Pf, 5%, 50v (Mica)	1506-0271-550
C155	250Pf, 5%, 50v (Mica)	1506-0251-550
C156	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C157	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C158	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C159	.002 mfd, 20%, 50v (Disc)	1523-0202-002
C160	39Pf, 10%, NPO, 50v (Disc)	1500-0390-650
C161	.047 mfd, 10%, 100v (Mylar film)	1508-0473-610
C162	.1 mfd, 20%, 12v (Disc)	1502-0104-005
C163	.1 mfd, 20%, 12v (Disc)	1502-0104-005
C164	.01 mfd, 10%, 100v (Mylar film)	1508-0103-610
C165	470Pf, 20%, 50v (Disc)	1523-0471-002
C166	.015 mfd, 10%, 100v (Mylar film)	1508-0153-610
C167	.047 mfd, 10%, 100v (Mylar film)	1508-0473-610
C168	.002 mfd, 20%, 50v (Disc)	1523-0202-002
C169	1 mfd, 16v, 85°C (Electrolytic)	1513-0010-002
C170	1 mfd, 16v, 85°C (Electrolytic)	1513-0010-002
C171	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C172	.015 mfd, 10%, 100v (Mylar film)	1508-0153-610
C173	.0033 mfd, 10%, 100v (Mylar film)	1508-0332-610
C174	5 mfd, 10v, 85°C (Electrolytic)	1513-0050-001
C175	.05 mfd, +80 -20%, 25v (Disc)	1502-0503-004
C176	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C177	100 mfd, 16v, 85°C (Electrolytic)	1513-0101-002
C178	.047 mfd, 10%, 100v (Mylar film)	1508-0473-610
C179	10 mfd, 10v, 85°C (Electrolytic)	1513-0100-001
C180	3.3 mfd, 20%, 10v, 85°C (Electrolyt.)	1513-0339-005
C181	.015 mfd, 10%, 100v (Mylar film)	1508-0153-610
C182	250 mfd, 10v, 85°C (Electrolytic)	1513-0251-001
C183	1000 mfd, 16v, 85°C (Electrolytic)	1513-0102-002
C184	3.9Pf, 10%, NPO, 500v (Disc)	1500-0399-905
C185	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C186	82Pf, 5%, NPO, 50v (Disc)	1524-0820-002
C187	15Pf, 10%, NPO, 50v (Disc)	1500,0150-650
C188	47pf, 5%, NPO, 50V (Disc.)	1524-0470-002
C189	0.2 mfd, +80 -20%, 12V (Disc.)	1502-0204-006

COILS

L101	Choke, .68 mhy	1802-0688-003
L102	Input, RF AMP (Green)	1800-3152-005
L103	Output, RF AMP (Yellow)	1800-3152-004
L104	Input, RF AMP (Red)	1800-3152-002
L105	Input, RF AMP (Red)	1800-3152-002
L106	Output, RF AMP (Orange)	1800-3152-003
L107	Input, RF AMP (UHF)	1800-3160-001
L108	Output, RF AMP (UHF)	1800-3160-002
L109	Choke, 15 mhy	1802-0152-004
L110	Choke, 15 mhy	1802-0152-004
L111	Choke, 15 mhy	1802-0152-004
L112	Choke, 15 mhy	1802-0152-004
L113	Choke, 15 mhy	1802-0152-004
L114	Choke, 15 mhy	1802-0152-004
L115	Choke, 15 mhy	1802-0152-004
L116	Choke, 15 mhy	1802-0152-004
L117	Choke, 15 mhy	1802-0152-004
L118	Choke, 15 mhy	1802-0152-004
L119	Oscillator, collector (White)	1800-3152-009
L120	Oscillator, emitter	1801-1236-900
L121	Tripler, collector	1800-3160-003
L122	10.7 MHz IF (White)	1800-3191-401
L123	10.7 MHz IF (White)	1800-3191-401
L124	10.7 MHz IF (Yellow)	1800-3191-402
L125	Choke, 6.8 mhy, 10%	1802-0689-003
L126	Choke, 820 mhy	1802-0000-002
L127	Choke, 820 mhy	1802-0000-002
L128	Quadrature Detector	1800-3151-700
L129	Oscillator, collector (White)	1800-3152-009

DIODES

CR101	Germanium - junction, signal	4807-1233-900
CR102	Germanium - junction, signal	4807-1233-900
CR103	Germanium - junction, signal	4807-1233-900
CR104	Germanium - junction, signal	4807-1233-900
CR105	Germanium - junction, signal	4807-1233-900
CR106	Germanium - junction, signal	4807-1233-900
CR107	Germanium - junction, signal	4807-1233-900
CR108	Germanium - junction, signal	4807-1233-900
CR109	Germanium - junction, signal	4807-1233-900
CR110	Germanium - junction, signal	4807-1233-900
CR111	Varactor, SMV 1172	4809-0000-001
CR112	Silicon, signal	4805-1241-200
CR113	Silicon, signal	4805-1241-200
CR114	Zener, 5.1v, 5%, 1W	4808-0000-007
CR115	Silicon, signal	4805-1241-200
CR116	Silicon, signal	4805-1241-200
CR117	Silicon, signal	4805-1241-200
CR118	Silicon, signal	4805-1241-200
CR119	Silicon, signal	4805-1241-200
CR120	Silicon, signal	4805-1241-200
CR121	Silicon, signal	4805-1241-200
CR122	Silicon, signal	4805-1241-200
CR123	Silicon, signal	4805-1241-200
CR124	Silicon, signal	4805-1241-200
CR125	Silicon, signal	4805-1241-200
CR126	Silicon, signal	4805-1241-200
CR127	Zener, 8.2v, 5%, 1W	4808-0000-009
CR128	Silicon, Rectifier	4806-0000-004
CR129	Silicon, Rectifier	4806-0000-004
CR130	Silicon, Rectifier	4806-0000-004

TRANSISTORS

Q101	Silicon, NPN (Red top)	4801-0000-035
Q102	Silicon, NPN (Red top)	4801-0000-035
Q103	Silicon, NPN (Red top)	4801-0000-035
Q104	Silicon, NPN (Red top)	4801-0000-035
Q105	Field Effect, junction	4811-0000-015

ACT-R10 H/L/U

NOTES:
1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD
   ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS
   ALL RESISTORS NOT SPECIFIED OTHERWISE ARE 1/4 WATT
2. TO USE EXTERNAL SPEAKER:
   a. OPEN LINK BETWEEN TERMINALS 2 AND 3 ON TB-1
   b. CONNECT 8 OHM EXTERNAL SPEAKER BETWEEN TERMINALS 1 AND 3 ON TB-1.
3. M301 — M310 ARE NO. 73 LAMPS.
4. ONLY ONE CRYSTAL (A OR B) INSTALLED AT ONE TIME

5 - 5-6 SCHEMATIC

Item	Description	Part No.
C128	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C129	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C130	.01 mfd, +80 -20%, 500v (Disc)	1502-0103-001
C131	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C132	82Pf, 5%, NPO, 50v (Disc)	1524-0820-002
C133	27Pf, 10%, NPO, 50v (Disc)	1500-0270-650
C134	27Pf, 10%, NPO, 50v (Disc)	1500-0270-650
C135	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C136	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C137	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C138	150Pf, 20%, 50v (Disc)	1523-0151-002
C139	1.5 - 5.5Pf, Trimmer	1517-0000-011
C140	470Pf, 20%, 50v (Disc)	1523-0471-002
C141	1 mfd, 16v 85°C (Electrolytic)	1513-0010-002
C142	3.9Pf, 10% (Composition)	1510-0399-900
C143	390Pf, 5%, 50v (Mica)	1506-0391-550
C144	3.9Pf, 10%, NPO, 500v (Disc)	1500-0399-905
C145	680Pf, 5%, 50v (Mica)	1506-0681-550
C146	390Pf, 5%, 50v (Mica)	1506-0391-550
C147	.005 mfd, +80 -20%, 500v (Disc)	1503-0502-002
C148	.01 mfd, +80 -20%, 25v (Disc)	1502-0103-004
C149	68Pf, 5%, NPO, 50v (Disc)	1524-0680-002
C150	180Pf, 5%, 50v (Mica)	1506-0181-550
C151	390Pf, 5%, 50v (Mica)	1506-0391-550
C152	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C153	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C154	270Pf, 5%, 50v (Mica)	1506-0271-550
C155	250Pf, 5%, 50v (Mica)	1506-0251-550
C156	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C157	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C158	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C159	.002 mfd, 20%, 50v (Disc)	1523-0202-002
C160	39Pf, 10%, NPO, 50v (Disc)	1500-0390-650
C161	.047 mfd, 10%, 100v (Mylar film)	1508-0473-610
C162	.1 mfd, 20%, 12v (Disc)	1502-0104-005
C163	.1 mfd, 20%, 12v (Disc)	1502-0104-005
C164	.01 mfd, 10%, 100v (Mylar film)	1508-0103-610
C165	470Pf, 20%, 50v (Disc)	1523-0471-002
C166	.015 mfd, 10%, 100v (Mylar film)	1508-0153-610
C167	.047 mfd, 10%, 100v (Mylar film)	1508-0473-610
C168	.002 mfd, 20%, 50v (Disc)	1523-0202-002
C169	1 mfd, 16v, 85°C (Electrolytic)	1513-0010-002
C170	1 mfd, 16v, 85°C (Electrolytic)	1513-0010-002
C171	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C172	.015 mfd, 10%, 100v (Mylar film)	1508-0153-610
C173	.0033 mfd, 10%, 100v (Mylar film)	1508-0332-610
C174	5 mfd, 10v, 85°C (Electrolytic)	1513-0050-001
C175	.05 mfd, +80 -20%, 25v (Disc)	1502-0503-004
C176	.2 mfd, +80 -20%, 12v (Disc)	1502-0204-006
C177	100 mfd, 16v, 85°C (Electrolytic)	1513-0101-002
C178	.047 mfd, 10%, 100v (Mylar film)	1508-0473-610
C179	10 mfd, 10v, 85°C (Electrolytic)	1513-0100-001
C180	3.3 mfd, 20%, 10v, 85°C (Electrolyt.)	1513-0339-005
C181	.015 mfd, 10%, 100v (Mylar film)	1508-0153-610
C182	250 mfd, 10v, 85°C (Electrolytic)	1513-0251-001
C183	1000 mfd, 16v, 85°C (Electrolytic)	1513-0102-002
C184	3.9Pf, 10%, NPO, 500v (Disc)	1500-0399-905
C185	.001 mfd, +80 -20%, 500v (Disc)	1503-0102-001
C186	82Pf, 5%, NPO, 50v (Disc)	1524-0820-002
C187	15Pf, 10%, NPO, 50v (Disc)	1500,0150-650
C188	47pf, 5%, NPO, 50V (Disc.)	1524-0470-002
C189	0.2 mfd, +80 -20%, 12V (Disc.)	1502-0204-006

COILS

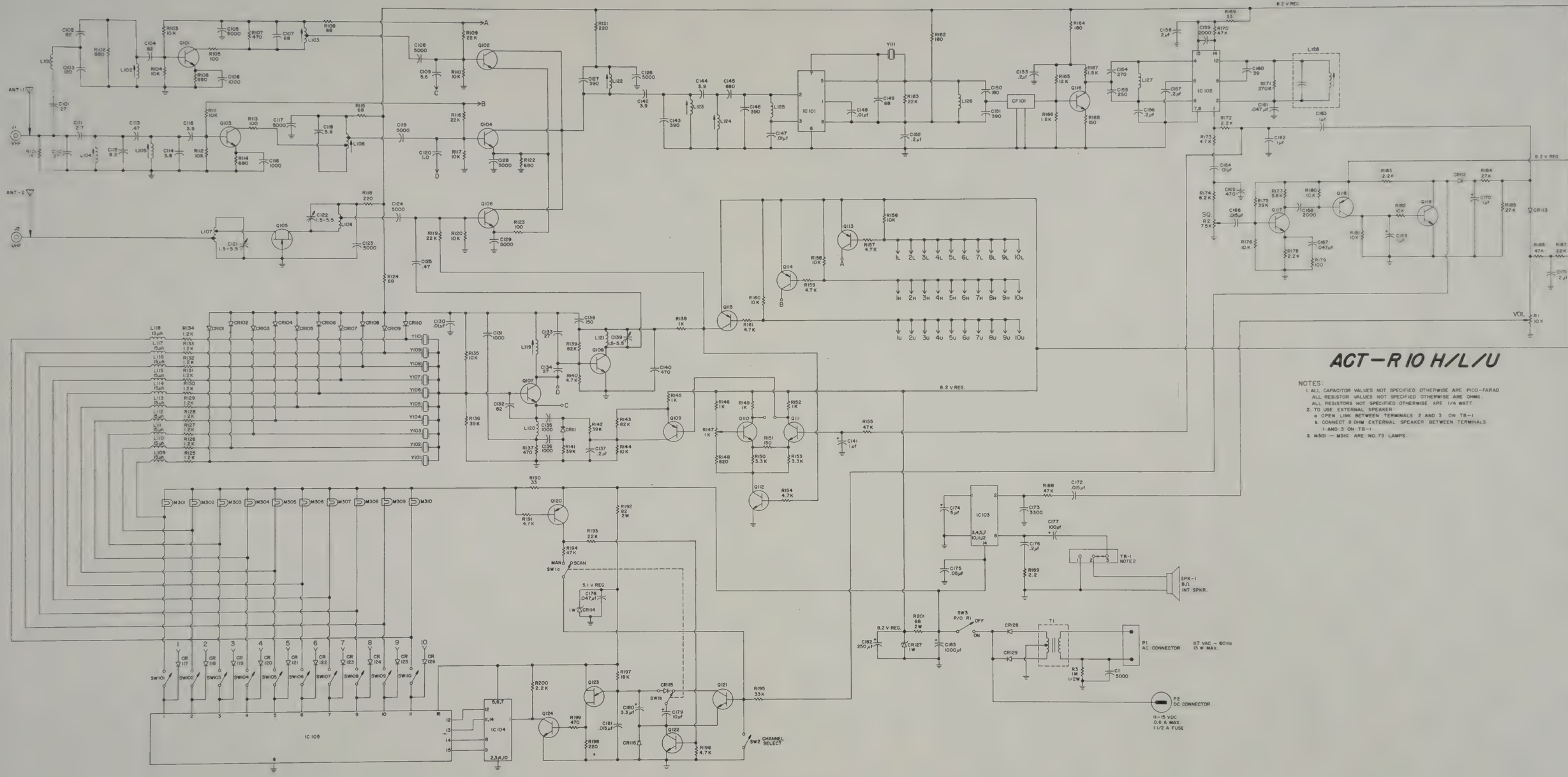
L101	Choke, .68 mhy	1802-0688-003
L102	Input, RF AMP (Green)	1800-3152-005
L103	Output, RF AMP (Yellow)	1800-3152-004
L104	Input, RF AMP (Red)	1800-3152-002
L105	Input, RF AMP (Red)	1800-3152-002
L106	Output, RF AMP (Orange)	1800-3152-003
L107	Input, RF AMP (UHF)	1800-3160-001
L108	Output, RF AMP (UHF)	1800-3160-002
L109	Choke, 15 mhy	1802-0152-004
L110	Choke, 15 mhy	1802-0152-004
L111	Choke, 15 mhy	1802-0152-004
L112	Choke, 15 mhy	1802-0152-004
L113	Choke, 15 mhy	1802-0152-004
L114	Choke, 15 mhy	1802-0152-004
L115	Choke, 15 mhy	1802-0152-004
L116	Choke, 15 mhy	1802-0152-004
L117	Choke, 15 mhy	1802-0152-004
L118	Choke, 15 mhy	1802-0152-004
L119	Oscillator, collector (White)	1800-3152-009
L120	Oscillator, emitter	1801-1236-900
L121	Tripler, collector	1800-3160-003
L122	10.7 MHz IF (White)	1800-3191-401
L123	10.7 MHz IF (White)	1800-3191-401
L124	10.7 MHz IF (Yellow)	1800-3191-402
L125	Choke, 6.8 mhy, 10%	1802-0689-003
L126	Choke, 820 mhy	1802-0000-002
L127	Choke, 820 mhy	1802-0000-002
L128	Quadrature Detector	1800-3151-700
L129	Oscillator, collector (White)	1800-3152-009

DIODES

CR101	Germanium - junction, signal	4807-1233-900
CR102	Germanium - junction, signal	4807-1233-900
CR103	Germanium - junction, signal	4807-1233-900
CR104	Germanium - junction, signal	4807-1233-900
CR105	Germanium - junction, signal	4807-1233-900
CR106	Germanium - junction, signal	4807-1233-900
CR107	Germanium - junction, signal	4807-1233-900
CR108	Germanium - junction, signal	4807-1233-900
CR109	Germanium - junction, signal	4807-1233-900
CR110	Germanium - junction, signal	4807-1233-900
CR111	Varactor, SMV 1172	4809-0000-001
CR112	Silicon, signal	4805-1241-200
CR113	Silicon, signal	4805-1241-200
CR114	Zener, 5.1v, 5%, 1W	4808-0000-007
CR115	Silicon, signal	4805-1241-200
CR116	Silicon, signal	4805-1241-200
CR117	Silicon, signal	4805-1241-200
CR118	Silicon, signal	4805-1241-200
CR119	Silicon, signal	4805-1241-200
CR120	Silicon, signal	4805-1241-200
CR121	Silicon, signal	4805-1241-200
CR122	Silicon, signal	4805-1241-200
CR123	Silicon, signal	4805-1241-200
CR124	Silicon, signal	4805-1241-200
CR125	Silicon, signal	4805-1241-200
CR126	Silicon, signal	4805-1241-200
CR127	Zener, 8.2v, 5%, 1W	4808-0000-009
CR128	Silicon, Rectifier	4806-0000-004
CR129	Silicon, Rectifier	4806-0000-004
CR130	Silicon, Rectifier	4806-0000-004

TRANSISTORS

Q101	Silicon, NPN (Red top)	4801-0000-035
Q102	Silicon, NPN (Red top)	4801-0000-035
Q103	Silicon, NPN (Red top)	4801-0000-035
Q104	Silicon, NPN (Red top)	4801-0000-035
Q105	Field Effect, junction	4811-0000-015



ACT-R10 H/L/U

NOTES:

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD
   ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS.
   ALL RESISTORS NOT SPECIFIED OTHERWISE ARE 1/4 WATT.
2. TO USE EXTERNAL SPEAKER:
   a. OPEN LINK BETWEEN TERMINALS 2 AND 3 ON TB-1
   b. CONNECT 8 OHM EXTERNAL SPEAKER BETWEEN TERMINALS 1 AND 3 ON TB-1
3. M301 — M310 ARE NO. 73 LAMPS.

3-8 SCHEMATIC

Item	Description	Part No.
Q106	Silicon, NPN (Red top)	4801-0000-035
Q107	Silicon, NPN	4801-0000-100
Q108	Silicon, NPN (Red top)	4801-0000-035
Q109	Silicon, PNP (White top)	4801-0000-060
Q110	Silicon, NPN	4801-0000-010
Q111	Silicon, NPN	4801-0000-010
Q113	Silicon, PNP (White top)	4801-0000-060
Q114	Silicon, PNP (White top)	4801-0000-060
Q115	Silicon, PNP (White top)	4801-0000-060
Q116	Silicon, NPN	4801-0000-010
Q117	Silicon, NPN	4801-0000-010
Q118	Silicon, PNP (White top)	4801-0000-060
Q119	Silicon, NPN	4801-0000-010
Q120	Silicon, PNP (White top)	4801-0000-060
Q121	Silicon, NPN	4801-0000-010
Q122	Silicon, NPN	4801-0000-010
Q123	Silicon, PN, Unijunction	4813-0000-001
Q124	Silicon, NPN	4801-0000-010
Q125	Silicon, NPN	4801-0000-100
	INTEGRATED CIRCUITS	
IC101	IF Amplifier	3130-3167-901
IC102	Limiter/Quadrature Detector	3130-3157-603
IC103	Audio Amplifier	3130-3157-614
IC104	Counter	3130-3157-608
IC105	Decoder/Driver	3130-3193-501
	CRYSTAL	
Y111	10.245 MHz (Standard)	2301-3151-601
Y111	11.155 MHz (Special)	2301-3151-602
	FILTER	
CF101	Ceramic, 455 KHz	2700-0000-007
	MISCELLANEOUS	
	Socket Pin, Crystal Mounting	2830-3216-400
	Terminal, Female (PC Mount)	2106-0000-002
	Terminal, Male (PC Mount)	2107-0000-003
	Terminal, Female (Wire Mount)	2107-0000-001
	Connector, 11 - pin, PC Mount	2105-0000-014
	Shield (Straight Section)	2508-1256-300
	Shield (L-shaped Section)	2508-1256-400
	Switch (10 Position)	5112-6038-401

PRELIMINARY SERVICE MANUAL

ACT-T-K100

REGENCY ELECTRONICS INC.
7707 Records Street
Indianapolis, Indiana
46226

0300-1208-500

ACT-T-K100 ALIGNMENT PROCEDURE

EQUIPMENT REQUIRED

FM Signal Generator
AC Voltmeter capable of reading 455 KHz
Frequency Counter
DC Voltmeter, preferably digital type

A. Reset Adjustment

1. Turn unit ON.

2. Connect DC Voltmeter to Pin 39 of IC401, (microprocessor).

3. Locate R405 and determine if it is mounted horizontally or vertically.

   3a. If HORIZONTAL, turn R405 fully counter-clockwise.

   3b. If VERTICAL, turn R405 fully clockwise.

   3c. Readout should indicate all "8's".

4. Turn R405 slowly back until readout just changes to "P. Fail". Note the voltage on Pin 39 of IC401.

5. Turn R405 further back until the voltage on Pin 39 of IC401 reads .15 volts higher than the reading noted in Step 4.

B. VCO Adjustment

1. Program 144 MHz (VCO = 133.255 MHz) into Channel 2. (It is not necessary to key in the decimal point or any zeros).

2. Program .512 MHz (VCO = 167.085 MHz) into Channel 1. (The leading decimal point removes the limits test and permits the proper entry of 512 MHz).

3. Note the voltage on the jumper adjacent to R206 (22K). It should be 9.1 to 9.6 volts.

4. While still in Channel 1, measure the voltage on the right end of R206 (end towards IC201).

5. Tune L201 until the voltage measured in Step 4 is 0.5 volts BELOW the voltage measured in Step 3 (approximately 8.6 to 9.1 volts).

6. Press MANUAL once to step to Channel 2 (144 MHz).

7. Measure the voltage at the right end of R206; voltage should now read 0.35 to 0.80 volts.

   NOTE: Display of "Poor F." indicates that L201 is badly mistuned. Repeat Steps 4 through 7.

C. Receiver - Low Band

1. Program 45 MHz in Channel 1.

2. Accurately set the Signal Generator to 45 MHz (no modulation) and connect its output to the receiver's antenna input jack. Adjust L112 for MAXIMUM signal on Pin 5 of IC101. Adjust Signal Generator output to maintain 0.1 to 0.2 volts.

3. Adjust L102 and L103 (in that order) for MAXIMUM AC voltage on Pin 5 of IC101. Adjust Signal Generator output to maintain reading of 0.1 to 0.2 volts.

4. Adjust L204 for MAXIMUM signal on Pin 5 of IC101.

5. Program 157 MHz in Channel 1.

6. Modulate Signal Generator with 1000 Hz, 3 KHz deviation.

7. Adjust L114 for MAXIMUM audio output.

D. Receiver - High Band

1. Program .512 MHz in Channel 2 (note decimal point preceeding digits).

2. Program 440 MHz in Channel 3.

3. Program 470 MHz in Channel 1.

4. While still in Channel 1, adjust L110 for MINIMUM DC voltage on the emitter of Q108.

5. Step to Channels 2 and 3, check the voltage on Q108 emitter. It should be within 0.1 volts of the final reading obtained in Step 4.

6. Program 163 MHz into Channel 1.

7. Adjust L105 and L106 for MAXIMUM signal on Pin 5 of IC101.

8. Adjust L107 for MAXIMUM signal on Pin 5 of IC101 and then turn core into coil 2 full turns.

9. Program 151 MHz into Channel 1.

10. Adjust R170 for MAXIMUM signal on Pin 5 of IC101.

E. Receiver - UHF Band

1. Program 492 MHz in Channel 1.

2. Adjust C127, C132, and C148, (in that order), for MAXIMUM signal on Pin 5 of IC101. Repeat adjustments until no further improvement can be made.

3. Program 460 MHz in Channel 1.

4. Adjust R171 for MAXIMUM signal on Pin 5 of IC101.

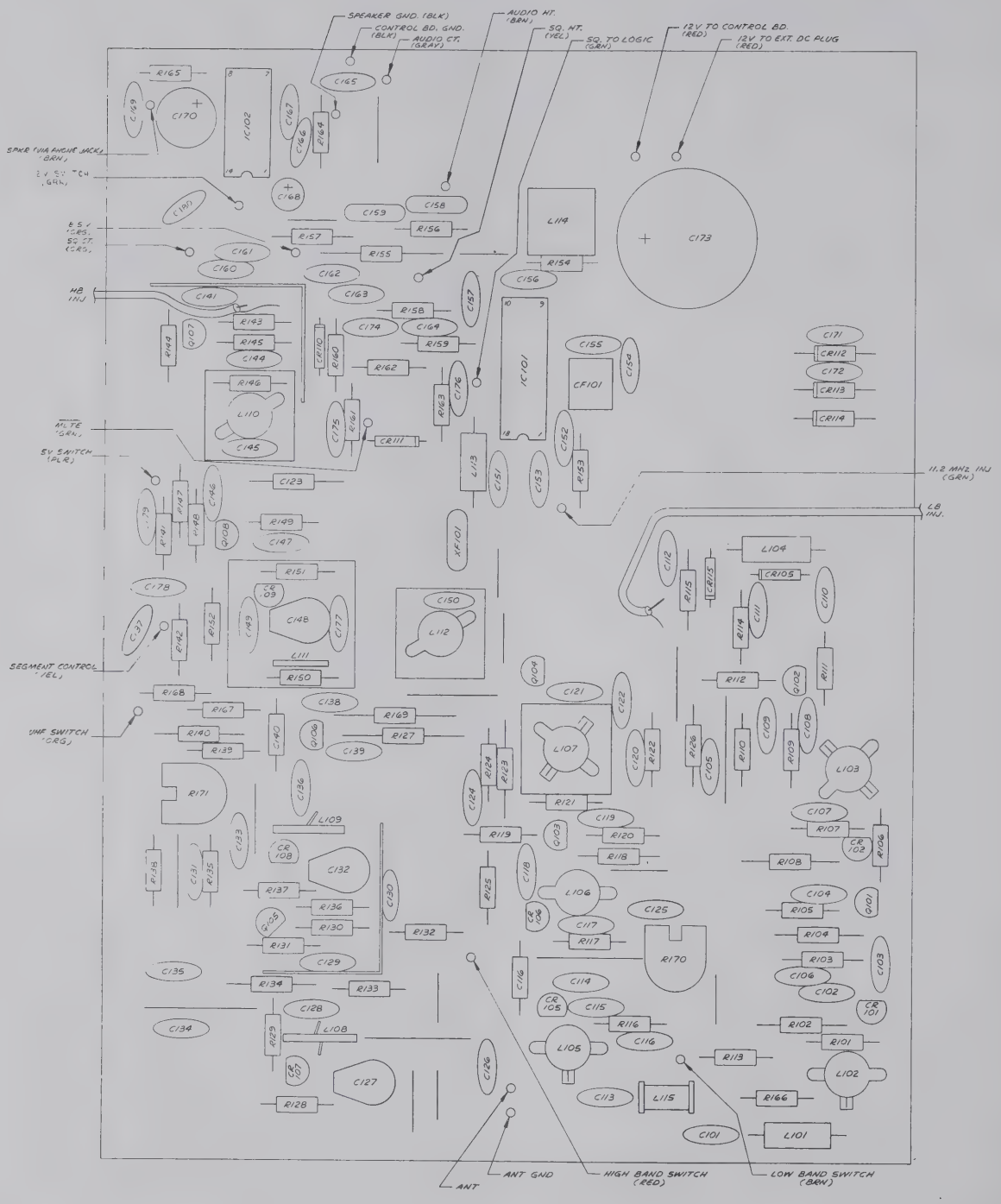
F. Netting Adjustment

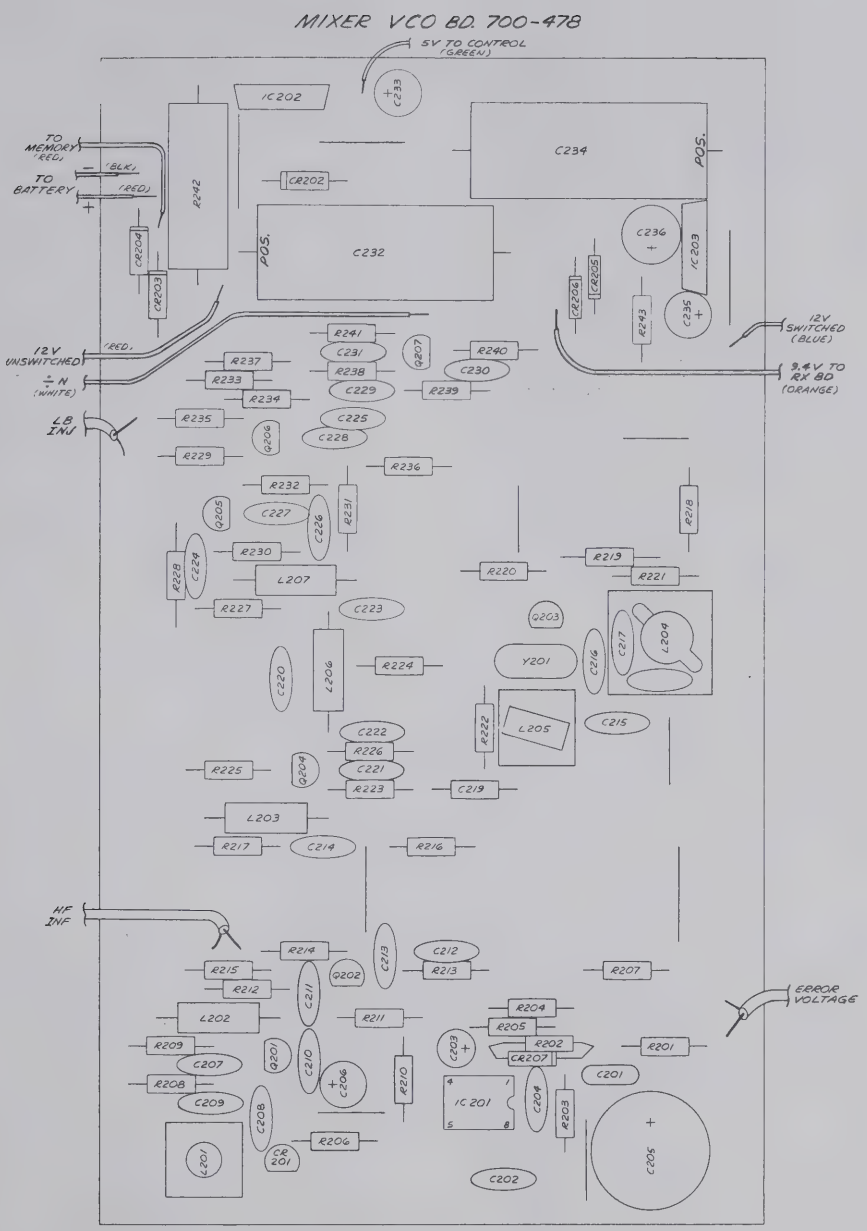
1. Program 162.745 MHz (VCO = 152.000 MHz) in Channel 1.

2. Connect Frequency Counter to the Junction of C141 and the coax cable.

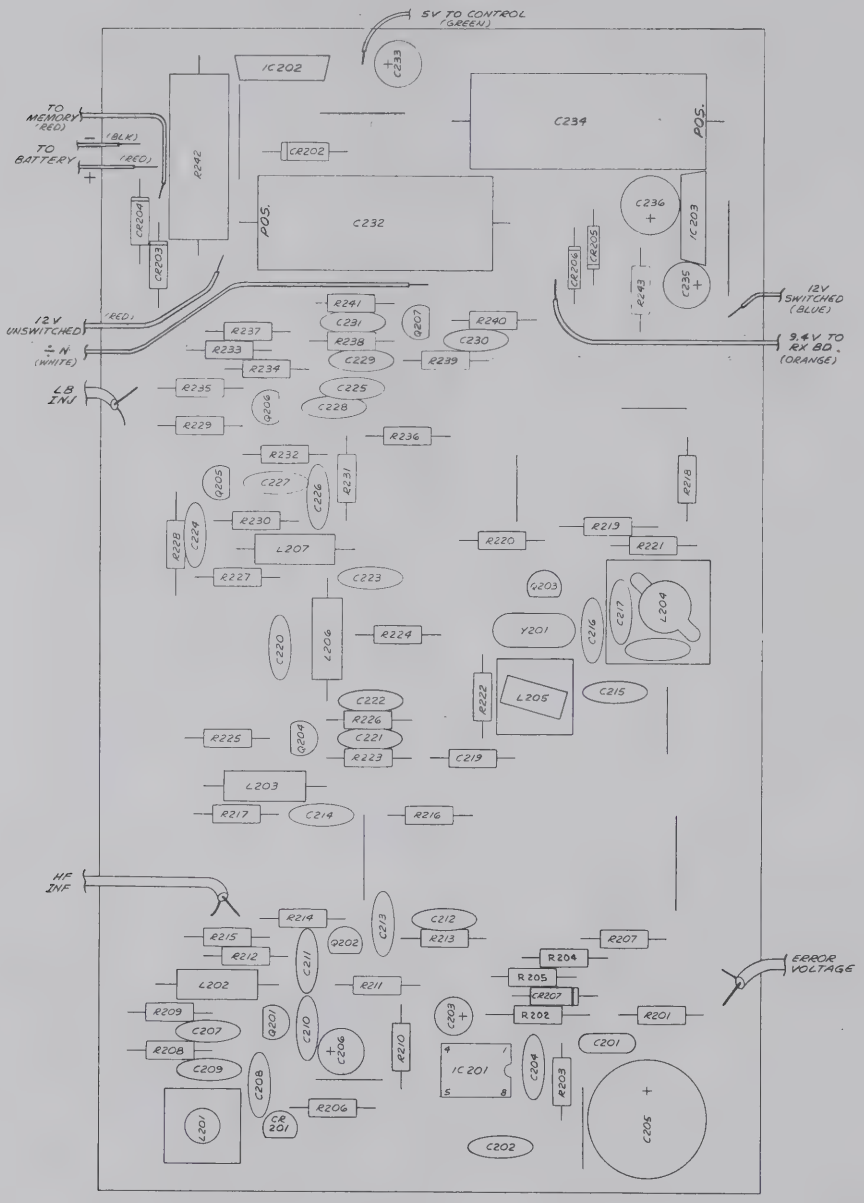
3. Adjust C416 (on logic board) for a frequency of 152.0000 MHz $\pm$500 Hz.

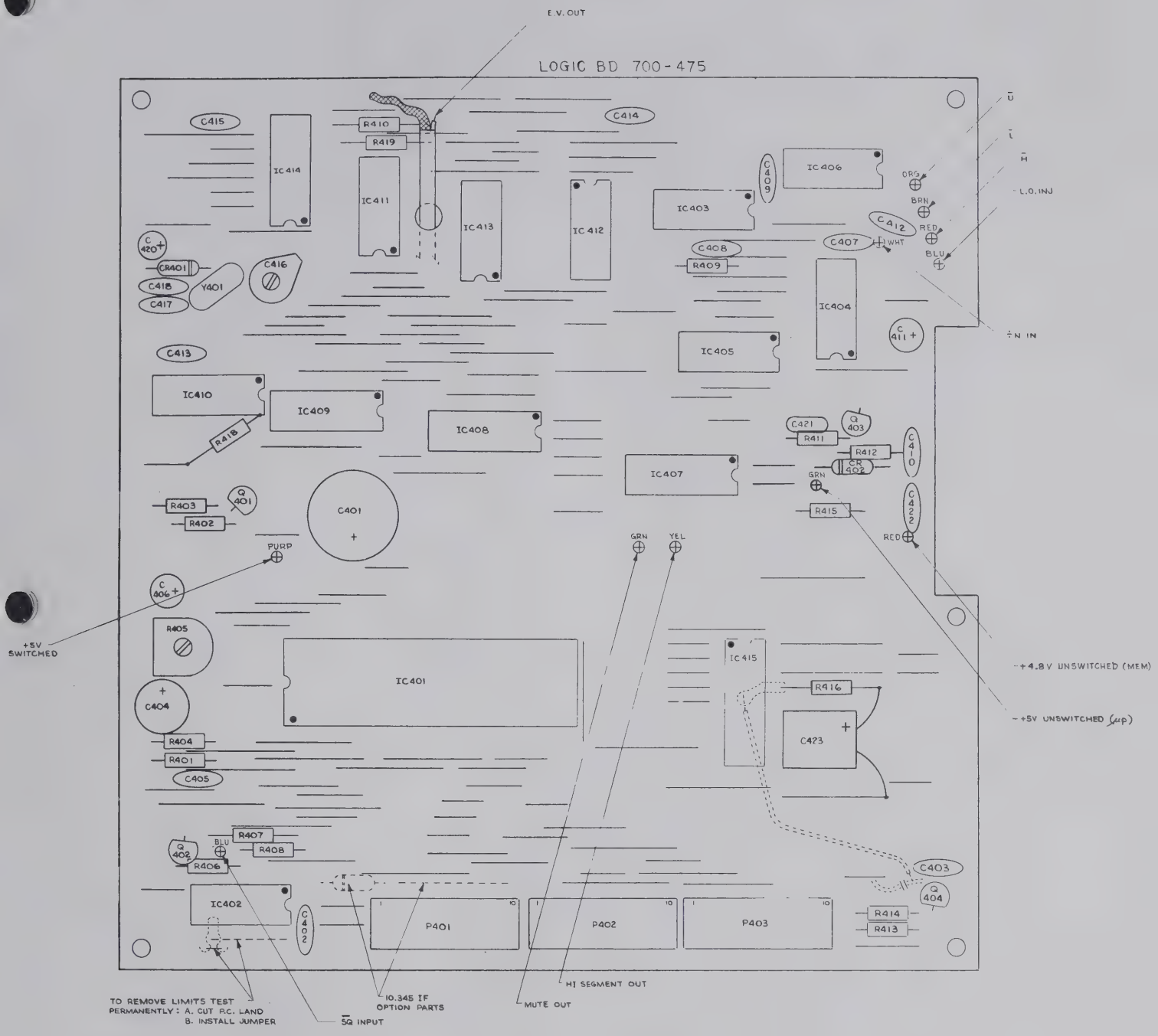
RECEIVER BOARD 700-472

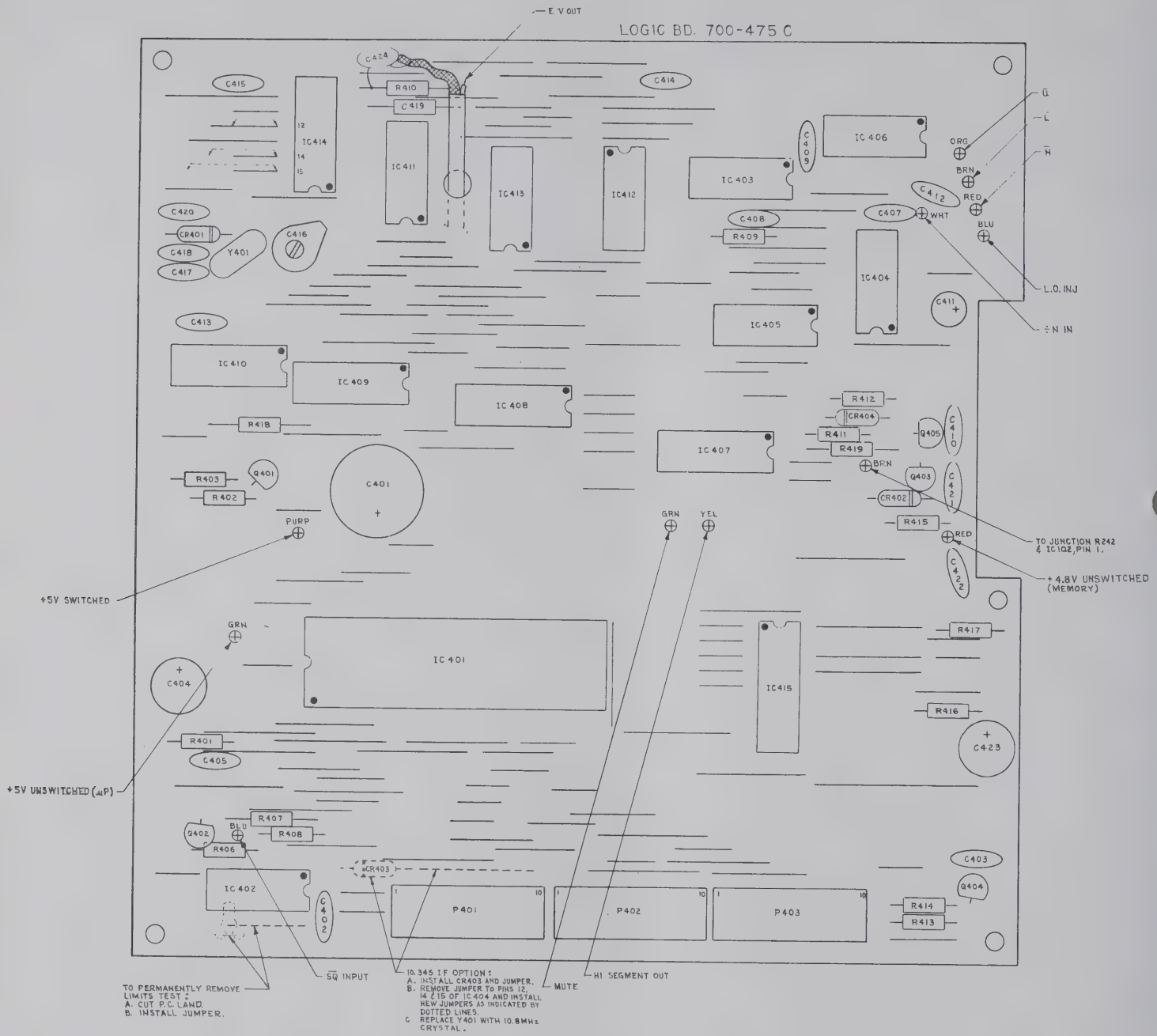



MIXER VCO BD. 700-478
5V TO CONTROL (GREEN)
IC202
C233
C234
POS.
TO MEMORY (RED)
(BLK)
TO BATTERY
(RED)
R242
CR202
CR204
CR203
C232
POS.
C236
IC203
CR206
CR205
R243
C235
12V SWITCHED (BLUE)
9.4V TO RX BD (ORANGE)
12V UNSWITCHED
(RED)
÷N (WHITE)
LB INJ
R241
C231
R238
C229
Q207
R240
C230
R239
R237
R233
R234
R235
C225
C228
Q206
R229
R236
R232
C227
Q205
C226
R231
R218
R230
C224
R228
L207
R227
C223
R220
R219
R221
Q203
C217
L204
C216
Y201
C220
L206
R224
R222
L205
C215
C222
R226
C221
R223
C219
R225
Q204
L203
R217
C214
R216
NF INF
R214
R215
R212
C213
C212
R213
Q202
C211
R207
ERROR VOLTAGE
L202
R211
R204
R205
R209
C207
R208
C209
Q201
C210
C206
R210
C203
R202
CR207
R201
C201
IC201
C204
R203
C205
C208
L201
CR201
R206
C202

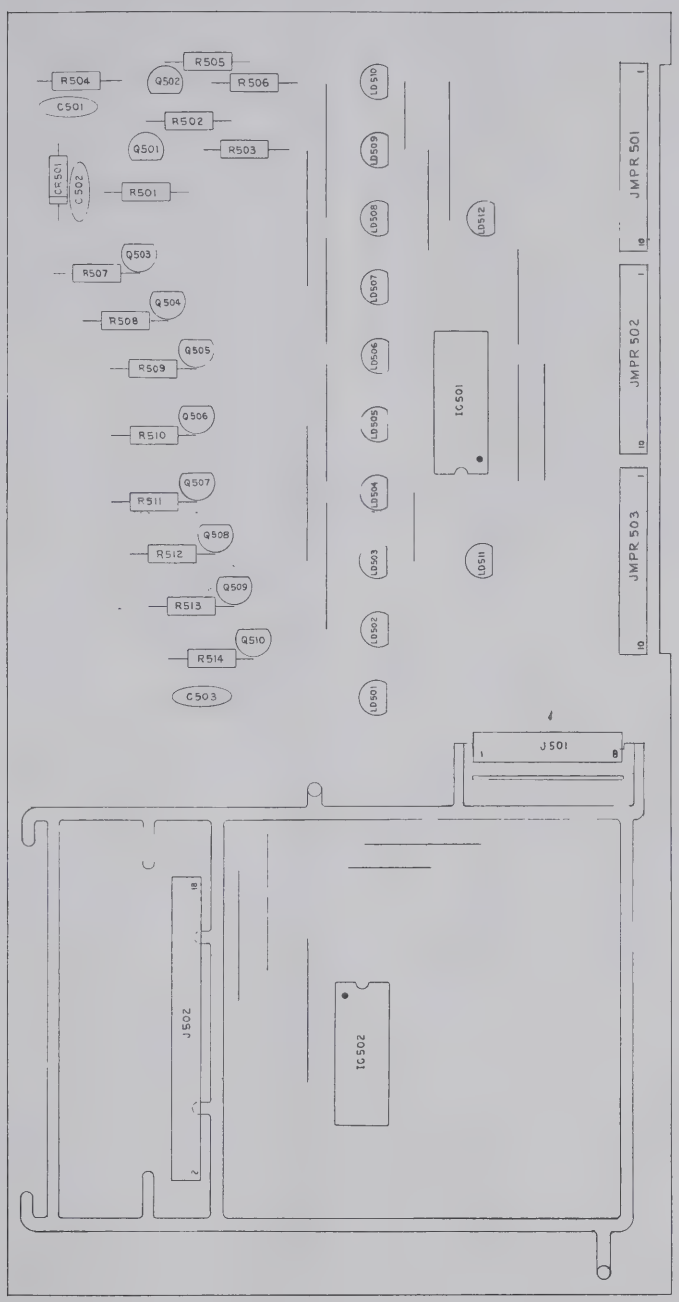
MIXER VCO BD. 700-478 C



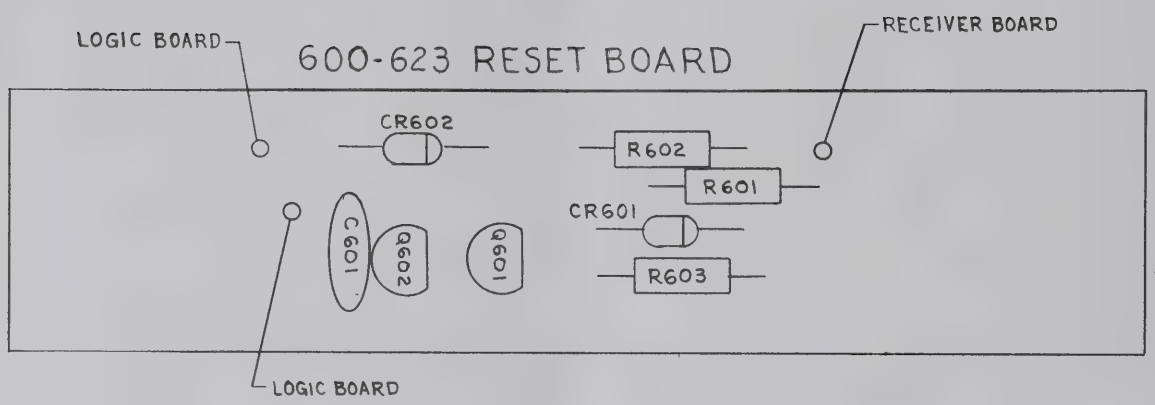

E.V. OUT
LOGIC BD 700-475
C415
R410
R419
C414
IC414
IC411
IC413
IC412
C409
IC406
IC403
C412
C407
C408
R409
IC404
C420+
CR401
C418
C417
Y401
C416
C411+
IC405
C413
IC410
IC409
IC408
R418
C421
R411
Q403
R412
CR402
C410
IC407
GRN
R415
C422
RED
R403
R402
Q401
C401
PURP
GRN
YEL
C406+
+5V SWITCHED
R405
IC401
IC415
R416
C404
C423
R404
R401
C405
R407
R408
BLU
Q402
R406
C403
Q404
IC402
C402
P401
P402
P403
R414
R413
ORG
BRN
RED
BLU
WHT
L.O. INJ
÷N IN
+4.8V UNSWITCHED (MEM)
+5V UNSWITCHED (µp)
HI SEGMENT OUT
MUTE OUT
10.345 IF OPTION PARTS
SQ INPUT
TO REMOVE LIMITS TEST PERMANENTLY: A. CUT P.C. LAND
B. INSTALL JUMPER

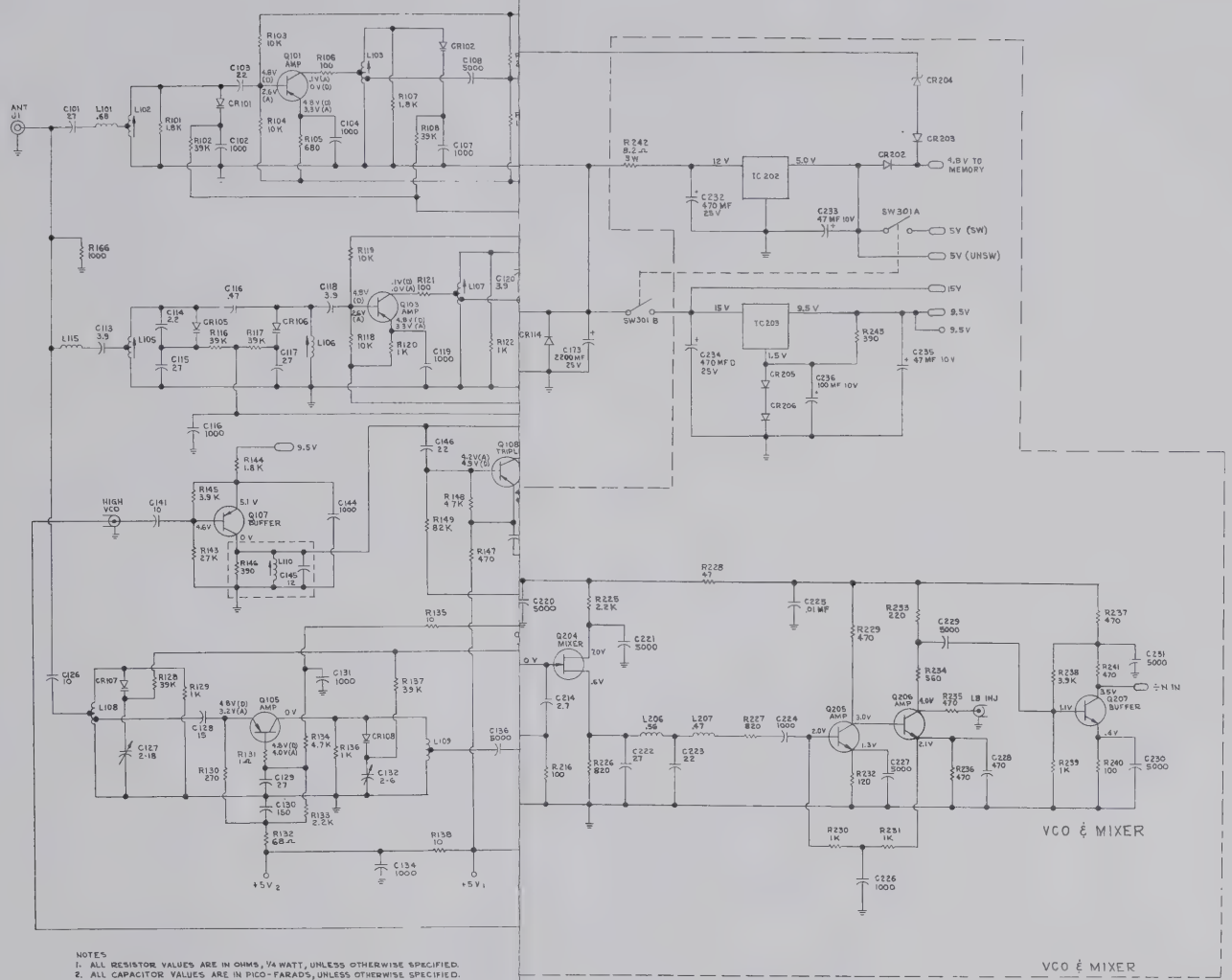

LOGIC BD. 700-475 C
E V OUT
C424
C415
R410
C419
C414
IC414
IC411
IC413
IC412
IC 406
IC 403
C409
C420
CR401
C418
C417
Y401
C416
C408
R409
C407
C412
ORG
BRN
RED
WHT
BLU
L.O. INJ
÷N IN
IC404
C411
IC405
C413
IC410
IC409
IC408
R412
CR404
R411
R419
Q405
C410
C421
Q403
CR402
R415
BRN
RED
TO JUNCTION R242 & IC102, PIN 1.
+4.8V UNSWITCHED (MEMORY)
C422
R418
R403
R402
Q401
C401
PURP
+5V SWITCHED
GRN
YEL
GRN
IC 401
IC415
R417
R416
C404
C423
R401
C405
+5V UNSWITCHED (μP)
R407
BLU
Q402
R408
R406
CR403
IC 402
C402
P401
P402
P403
C403
Q404
R414
R413
TO PERMANENTLY REMOVE LIMITS TEST:
A. CUT P.C. LAND.
B. INSTALL JUMPER.
SQ INPUT
10.345 I.F. OPTION:
A. INSTALL CR403 AND JUMPER.
B. REMOVE JUMPER TO PINS 12, 14 & 15 OF IC 404 AND INSTALL NEW JUMPERS AS INDICATED BY DOTTED LINES.
C. REPLACE Y401 WITH 10.8MHz CRYSTAL.
MUTE
HI SEGMENT OUT

DISPLAY BOARD
700-495



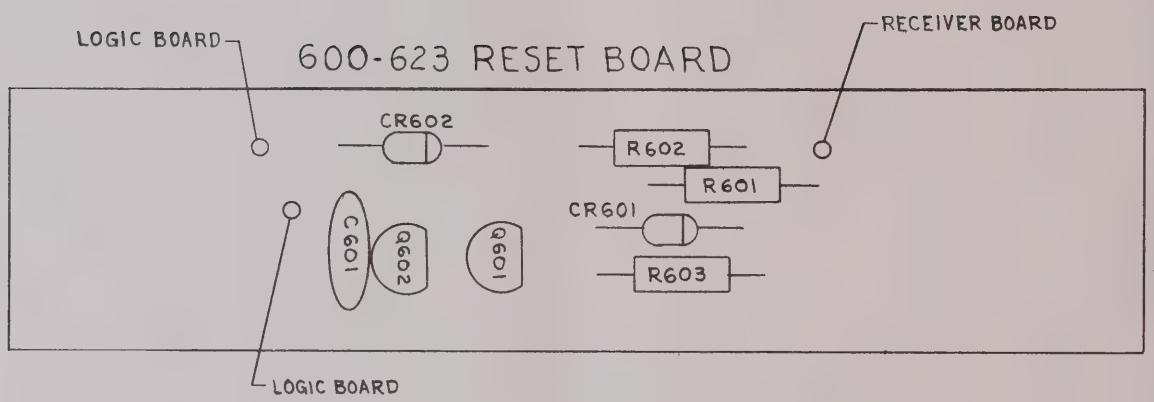
NOTE
PIN 1 OF J502 IS OMITTED.

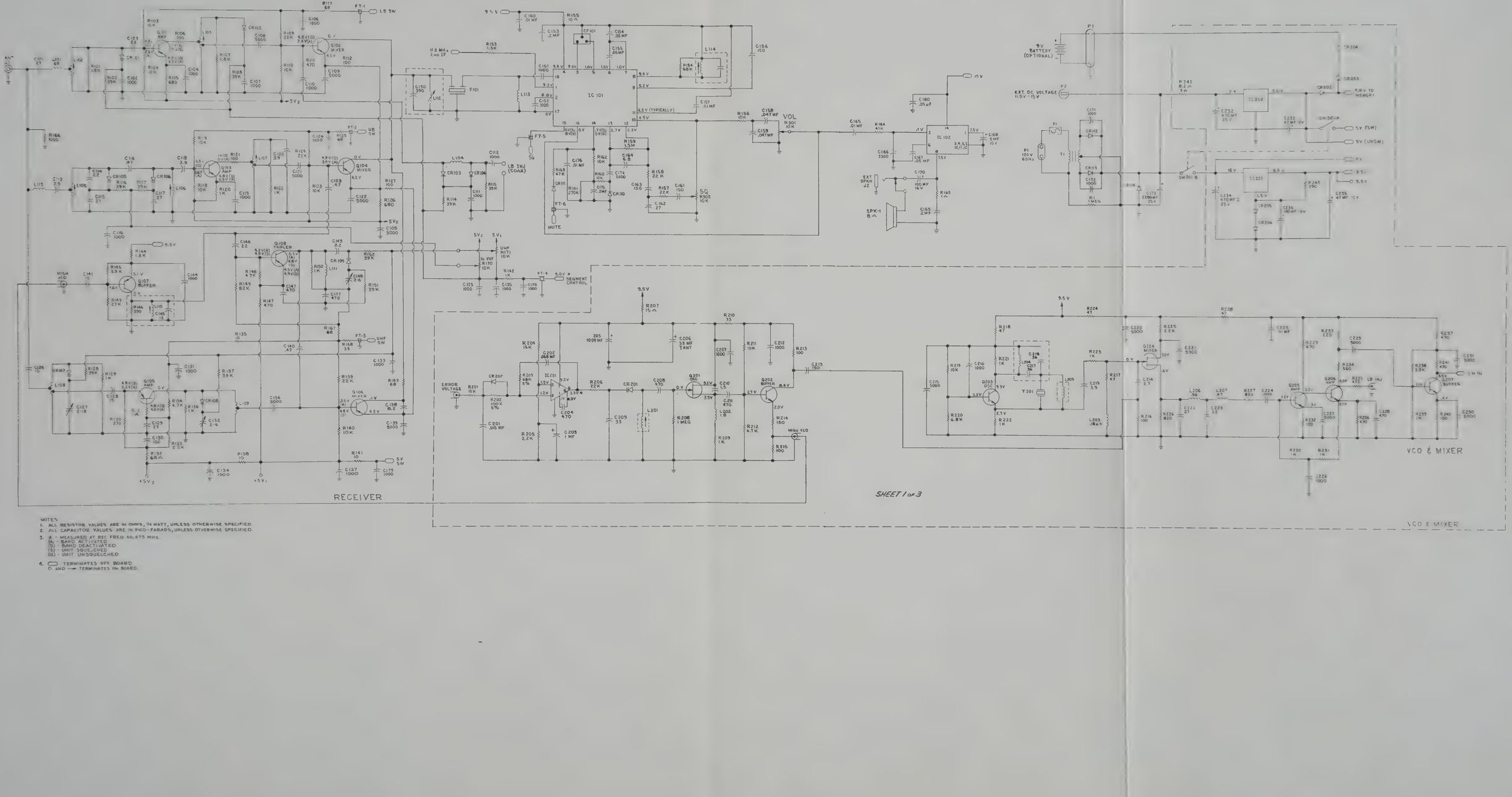

LOGIC BOARD
600-623 RESET BOARD
RECEIVER BOARD
CR602
R602
R601
CR601
R603
C601
Q602
Q601
LOGIC BOARD



NOTES

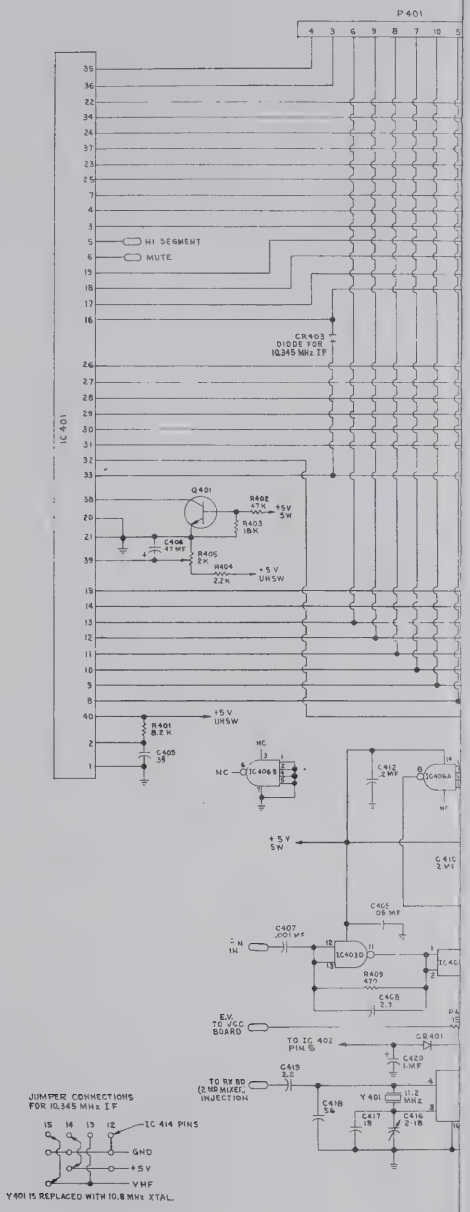
1. ALL RESISTOR VALUES ARE IN OHMS, ¼ WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN PICO-FARADS, UNLESS OTHERWISE SPECIFIED.
3. ⅘ - MEASURED AT REC FREQ 40.475 MHz.
   (A) - BAND ACTIVATED
   (D) - BAND DEACTIVATED
   (S) - UNIT SQUELCHED
   (U) - UNIT UNSQUELCHED
4. ▭ TERMINATES OFF BOARD.
   ○ AND ⟶ TERMINATES ON BOARD.

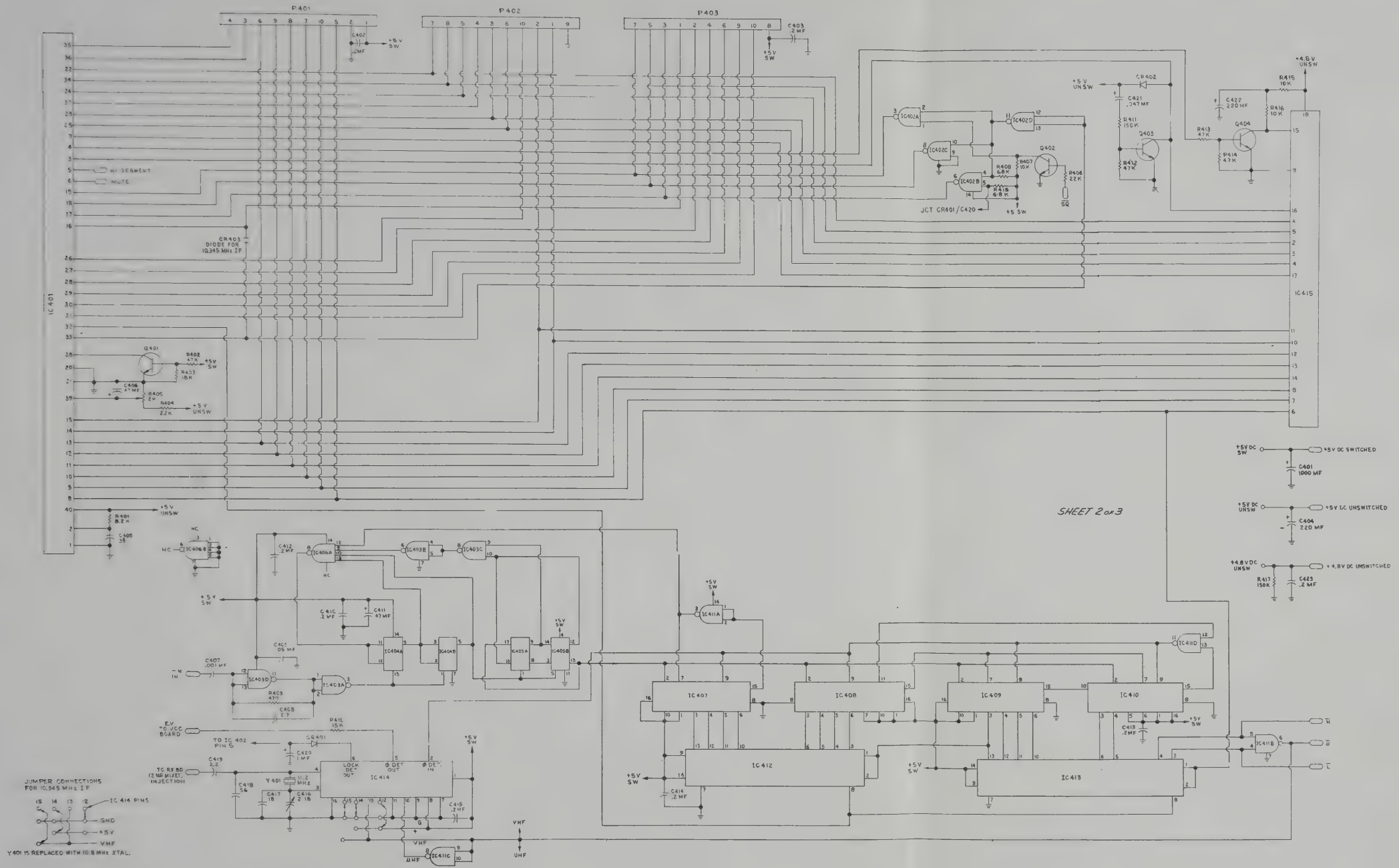

LOGIC BOARD
600-623 RESET BOARD
RECEIVER BOARD
CR602
R602
R601
CR601
R603
C601
Q602
Q601
LOGIC BOARD

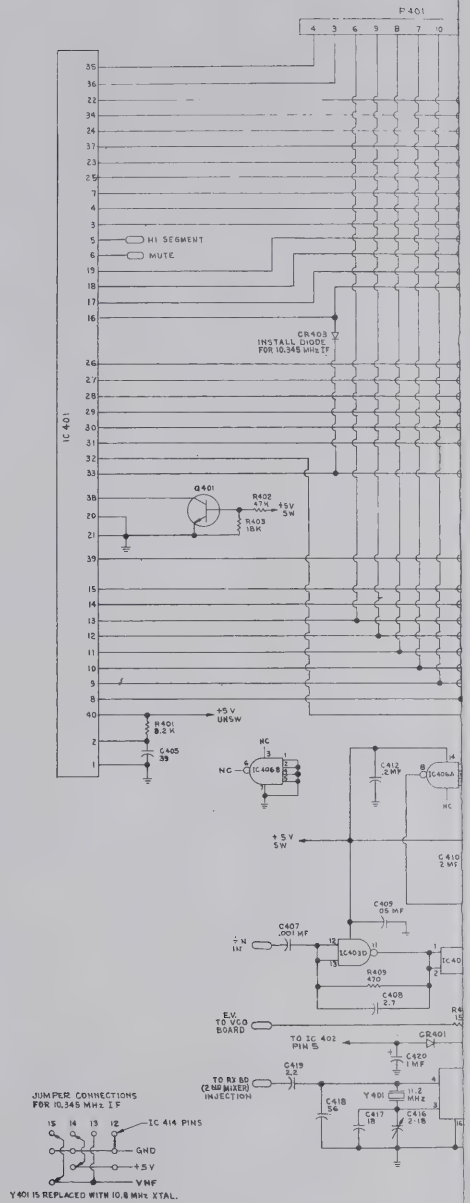


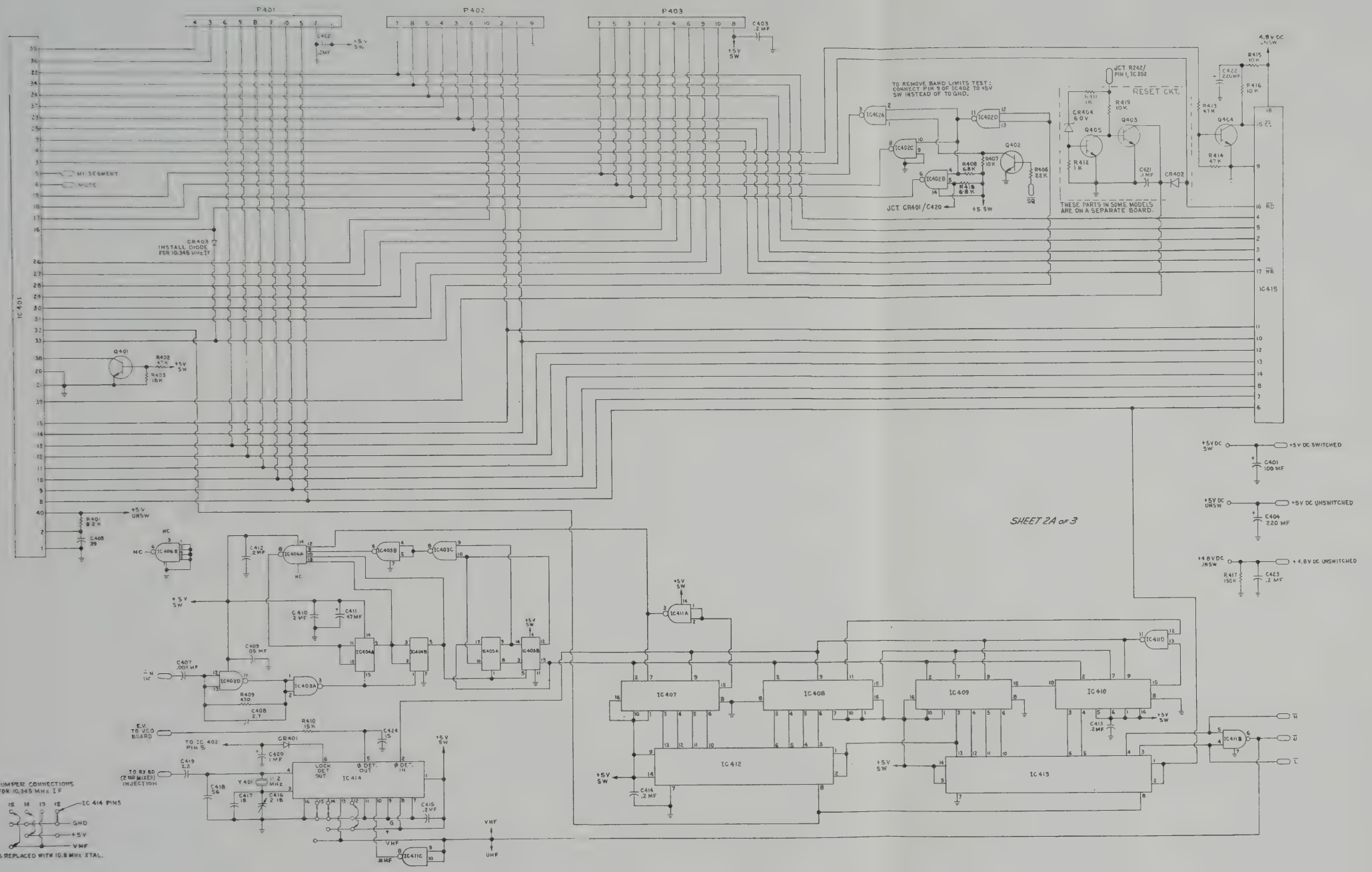
NOTES

1. ALL RESISTOR VALUES ARE IN OHMS, ¼ WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN PICO-FARADS, UNLESS OTHERWISE SPECIFIED.
3. # - MEASURED AT REC FREQ 40.475 MHz.
   (A) - BAND ACTIVATED
   (D) - BAND DEACTIVATED
   (S) - UNIT SQUELCHED
   (U) - UNIT UNSQUELCHED
4. ⊂⊃ TERMINATES OFF BOARD
   ○ AND — TERMINATES ON BOARD.

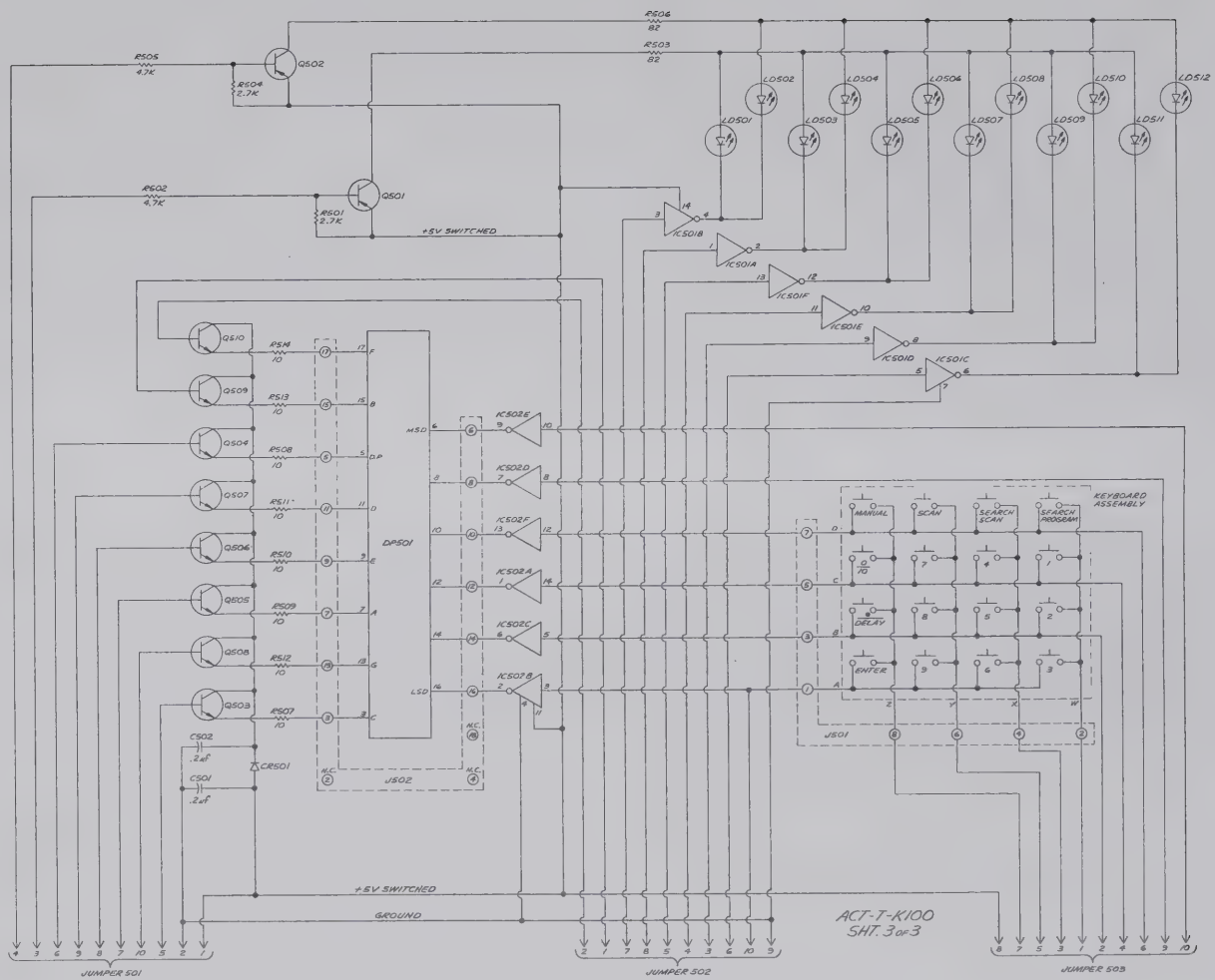

P401
IC 401
HI SEGMENT
MUTE
CR403
DIODE FOR
10.345 MHz IF
Q401
R402
47K
+5V
SW
R403
18K
C406
47 MF
R405
2K
R404
22K
+5 V
UNSW
R401
8.2 K
C405
.1 MF
+5 V
UNSW
NC
IC4068
C412
.2 MF
IC4066
+5 V
SW
C410
2 MF
C405
.05 MF
C407
.001 MF
÷ N
IN
IC403D
R409
470
C408
2.7
E.V.
TO VCC
BOARD
TO IC 402
PIN 6
CR401
C420
1 MF
C419
2.2
TO RX BD
(2 NF MIXER
INJECTION
Y401
11.2
MHz
C418
56
C417
18
C416
2-18
JUMPER CONNECTIONS
FOR 10.345 MHz I F
15 14 13 12
IC 414 PINS
GND
+5 V
VHF
Y401 IS REPLACED WITH 10.8 MHz XTAL.


P401
P402
P403
HI SEGMENT
MUTE
CR403 DIODE FOR 10.345 MHz IF
IC401
IC415
JCT CR401/C420
SQ
JUMPER CONNECTIONS FOR 10.345 MHz I.F
IC 414 PINS
GND
+5 V
VHF
Y401 IS REPLACED WITH 10.8 MHz XTAL.
TO RX BD 12 MC MIXER INJECTION
TO IC 402 PIN 5
E-V TO VCC BOARD
+5V DC SW
+5V DC SWITCHED
+5V DC UNSW
+5V DC UNSWITCHED
+4.8V DC UNSW
+4.8 V DC UNSWITCHED
SHEET 2 OF 3


P401
4 3 6 9 8 7 10
IC 401
35 36 22 34 24 37 23 25 7 4 3 5 6 19 18 17 16 26 27 28 29 30 31 32 33 38 20 21 39 15 14 13 12 11 10 9 8 40 2 1
HI SEGMENT
MUTE
CR403
INSTALL DIODE
FOR 10.345 MHz IF
Q401
R402
47K
+5V
SW
R403
18K
R401
8.2 K
+5V
UNSW
C405
39
NC
IC406B
C412
.2 MF
IC406A
+5V
SW
C410
2 MF
C409
.05 MF
C407
.001 MF
÷N
IN
IC403D
IC 40
R409
470
C408
2.7
R4
15
E.V.
TO VCO
BOARD
TO IC 402
PIN 5
CR401
C420
1 MF
C419
2.2
TO RX BD
(2nd MIXER)
INJECTION
Y401
11.2
MHz
C418
56
C417
18
C416
2-18
JUMPER CONNECTIONS
FOR 10.345 MHz IF
15 14 13 12
IC 414 PINS
GND
+5V
VMF
Y401 IS REPLACED WITH 10.8 MHz XTAL.


P401
P402
P403
C403 .2 MF
+5V SW
C402 .2MF
+5V SW
TO REMOVE BAND LIMITS TEST: CONNECT PIN 9 OF IC402 TO +5V SW INSTEAD OF TO GND.
JCT R242/ PIN 1, IC202
RESET CKT.
4.8 V DC UNSW
R415 10K
C422 220MF
R416 10K
R413 47K
R414 47K
Q404
R411 1K
CR404 6.0V
R419 10K
Q405
Q403
R412 1K
C421 .1MF
CR402
THESE PARTS IN SOME MODELS ARE ON A SEPARATE BOARD.
IC402A
IC402D
IC402C
IC402B
Q402
R408 68K
R407 10K
R406 22K
R418 68K
SQ
JCT CR401/C420
+5 SW
M1 SEGMENT
MUTE
CR403 INSTALL DIODE FOR 10.345 MHz IF
IC 401
IC 415
RD
WR
Q401
R402 47K
+5V SW
R403 18K
+5V UNSW
R401 8.2K
C405 39
NC
IC406B
IC406A
C412 .2MF
IC403B
IC403C
+5V SW
C410 2 MF
C411 47 MF
IC404A
IC404B
IC405A
IC405B
C409 05 MF
C407 .001 MF
÷ N 1 MF
IC403D
IC403A
R409 470
C408 2.7
R410 15K
C424 15
E.V. TO VCO BOARD
TO IC 402 PIN 5
GR401
C419 2.2
TO RX BD (2ND MIXER) INJECTION
C420 1 MF
Y401 11.2 MHz
C418 56
C417 18
C416 2.18
IC 414
LOCK DET OUT
Ø DET. OUT
Ø DET. IN
C415 .2MF
VHF
UHF
MMF
IC411C
JUMPER CONNECTIONS FOR 10.345 MHz I F
IC 414 PINS
GND
+5V
VHF
Y401 IS REPLACED WITH 10.8 MHz XTAL.
+5V SW
IC411A
IC411D
IC407
IC408
IC409
IC410
IC412
IC413
C413 .2MF
IC411B
+5V DC SW
+5V DC SWITCHED
C401 100 MF
+5V DC UNSW
+5V DC UNSWITCHED
C404 220 MF
+4.8V DC UNSW
+4.8V DC UNSWITCHED
R417 150K
C423 .2 MF

SHEET 2A of 3


R506 82
R503 82
R505 4.7K
Q502
R504 2.7K
Q501
R502 4.7K
R501 2.7K
+5V SWITCHED
LD501
LD502
LD503
LD504
LD505
LD506
LD507
LD508
LD509
LD510
LD511
LD512
IC501B
IC501A
IC501F
IC501E
IC501D
IC501C
Q510
Q509
Q504
Q507
Q506
Q505
Q508
Q503
R514 10
R513 10
R508 10
R511 10
R510 10
R509 10
R512 10
R507 10
DP501
MSD
LSD
IC502E
IC502D
IC502F
IC502A
IC502C
IC502B
C502 .2uf
C501 .2uf
CR501
J502
KEYBOARD ASSEMBLY
MANUAL
SCAN
SEARCH SCAN
SEARCH PROGRAM
RESET
DELAY
ENTER
J501
+5V SWITCHED
GROUND
JUMPER 501
JUMPER 502
JUMPER 503
ACT-T-K100
SHT. 3 OF 3

ACT-T-K100 PARTS LIST

RECEIVER BOARD

Item No.	Description	Part No.
	Transistors	
Q101, 102, 103, Q104, 105, 106, Q107, 108	PNP	4801-0000-026
	Integrated Circuits	
IC101	IF	3130-6056-500
IC102	Audio	3130-3157-614
	Diodes	
CR101, 102	Varactor	4809-0000-001
CR103, 104	Varactor	4809-0000-008
CR105, 106, CR107, 108, CR109	Varactor	4809-0000-004
CR110, 111	Silicon	4805-1241-200
CR112, 113, CR114	Silicon, Power	4806-0000-004
	Coils	
L101	Choke .68 uhy	1802-0688-003
L102	Ant, Low Band, (White)	1800-3283-901
L103	RF, Low Band, (White)	1800-3283-902
L104	Choke 1.8 uhy	1803-3268-208
L105	Ant, High Band, Primary, (Brown)	1800-3152-001
L106	Ant, High Band, Secondary, (Red)	1800-3152-002
L107	RF, High Band, (Yellow)	1800-3152-014

ACT-T-K100 PARTS LIST CONTINUED

RECEIVER BOARD

Item No.	Description	Part No.
	Coils Continued	
L108	Ant, UHF	1800-3255-201
L109	RF, UHF	1800-3160-005
L110	Buffer	1800-3152-009
L111	Tripler	1800-3160-003
L112	IF, (White)	1800-3191-401
L113	Choke, 39 uhy	1803-3268-201
L114	Quadrature	1800-6055-801
L115	Choke, .24 uhy	1803-5125-903
	Capacitors	
C127	Trimmer, 2.5-20 PF	1517-0000-034
C132, 148	Trimmer, 2-6 PF	1517-0000-035
	Resistors	
R170, 171	Variable 10K Ohm	4751-0103-001
	Filters	
CF101	Ceramic, 455 KHz	2700-3274-100
XF101	Crystal, 10.745 MHz	2705-3288-000

ACT-T-K100 PARTS LIST CONTINUED

LOGIC BOARD

Item No.	Description	Part No.
	Transistors	
Q401, 402, 403, Q404, 405	NPN	4801-0000-010
	Integrated Circuits	
IC401	Processor	3130-6060-302
IC402	Logic	3130-3157-633
IC403	Logic	3130-3157-612
IC404	Logic	3130-3157-613
IC405	Logic	3130-3157-634
IC406	Logic	3130-3157-643
IC407, 408, IC409, 410	Logic	3130-3193-515
IC411	Logic	3130-3157-631
IC412, 413	Logic	3130-1357-636
IC414	Ref. Phase Det.	3130-6059-600
IC415	Ram	3130-3281-601
	Diodes	
CR401	Germanium	4807-1233-900
CR402	Silicon	4805-1241-200
CR404	Zener, 6V	4808-0000-025

ACT-T-K100 PARTS LIST CONTINUED

LOGIC BOARD CONTINUED

Item No.	Description	Part No.
	Capacitors	
C416	Trimmer, 2.5-20 PF	1517-0000-034
	Crystal	
Y401	Reference, 11.2 MHz	2338-3283-201
	MIXER/VCO BOARD	
	Transistors	
Q201	FET	4811-0000-020
Q202, 205, Q206, 207	NPN (Red Top)	4801-0000-035
Q203	NPN	4801-0000-100
Q204	FET	4811-0000-030
	Integrated Circuits	
IC201	Op Amp	3130-3167-914
IC202	Regulator 5V	3130-0000-022
IC203	Regulator 8V	3130-0000-020
	Diodes	
CR201	Varactor	4809-0000-003
CR202, 203	Germanium	4807-1233-900
CR204	Zener 4.3V	4808-0000-039
CR205, 206	Silicon	4805-1241-200
CR207	Silicon	4805-1241-201

ACT-T-K100 PARTS LIST CONTINUED

MIXER/VCO BOARD CONTINUED

Item No.	Description	Part No.
	Coils	
L201	VCO	1800-3284-300
L202	Choke 1.8 uhy	1803-3268-208
L203	Choke .18 uhy	1803-3268-204
L204	Ref Oscillator	1800-3152-002
L205	Choke	1803-5125-903
L206	Choke, .47 uhy	1803-3268-207
L207	Choke .56 uhy	1803-3268-206
	Crystal	
Y201	Reference, 120.91	2339-3283-100
	LED/DISPLAY BOARD	
	Transistors	
Q501, 502	PNP, (White Top)	4801-0000-060
Q503, 504, 505, Q506, 507, 508, Q509, 510	NPN	4801-0000-010
	Integrated Circuits	
IC501	LED Drivers	3130-3157-642
IC502	Display Drivers	3130-3157-630
	Diode	
CR501	Silicon, Power	4806-0000-004

ACT-T-K100 PARTS LIST CONTINUED

LED/DISPLAY BOARD

Item No.	Description	Part No.
	Display	
DP501	6 Digit	2000-5141-001
	Keyboard	
KB501	Keyboard Assembly	2001-7049-300
	CONTROL BOARD	
R301	Control, Volume, 10K	4752-5135-306
R302	Control, Squelch, 10K	4752-5135-305
SW301	Switch, OFF-ON, DPDT	5113-5136-001
	RESET BOARD	
	Transistors	
Q601, 602	NPN	4801-0000-010
	Diodes	
CR601	6.0V Zener	4808-0000-025
CR602	Silicon	4805-1241-200
	Miscellaneous	
T1	Power Transformer	5604-5142-400
SPK-1	Speaker, 8 Ohm, 2W	1301-3273-200
	Antenna, Telescope	1201-5108-801
	Knob, Volume & Squelch	2402-5136-600
	Wrap Assembly	7011-1205-100
	Rubber Bumper	1401-0000-003